FOLDABLE FLIGHT'S INCREDIBLE PAPER AIRPLANES

+ video tutorials!

15 STEP-BY-STEP DESIGNS

Kyle Boyer

Written and illustrated by Kyle Boyer
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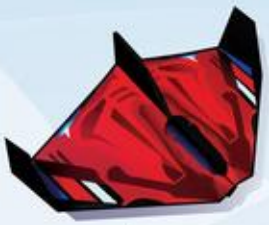
FOLDABLE FLIGHT'S INCREDIBLE PAPER AIRPLANES

To my grandmothers, who got me into paper airplanes and science; to my parents, who always believe in me; to my sister, who I look up to so much; and to my dear wife, who patiently puts up with me.



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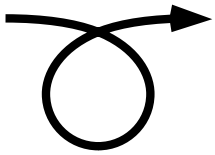
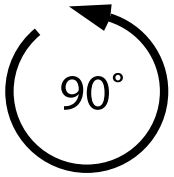
What do these symbols mean?

You'll come across a bunch of symbols in this book. Each one has a specific meaning for communicating specific folding instructions. Knowing what these symbols mean will help you to successfully fold each plane, so let's take a look at them here:



turn over



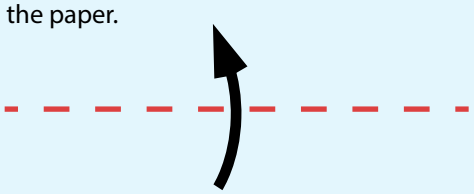
rotate

Some symbols are self-explanatory.

Valley Folds

A red dashed line, like the one below, tells you to make a valley fold.

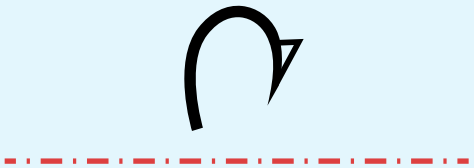
The arrow tells you which direction to fold the paper.



Mountain Folds

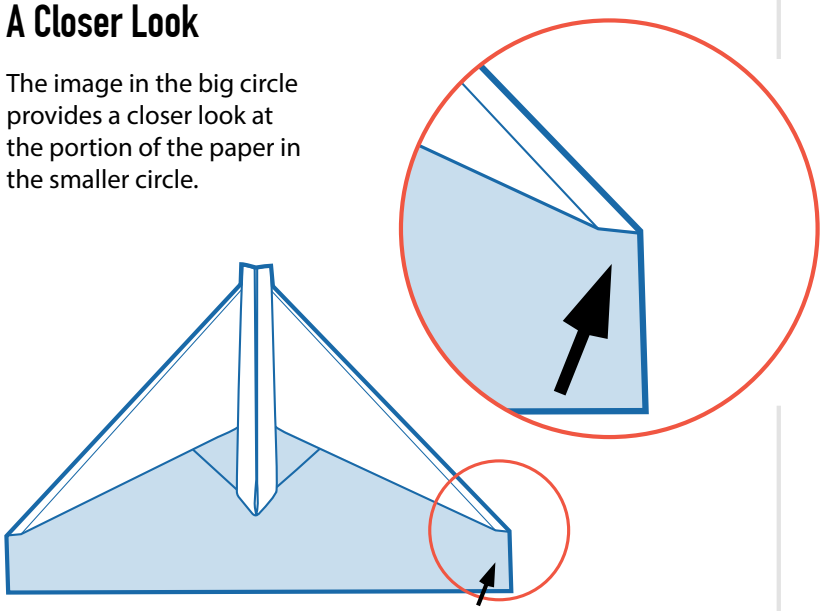
A red dashed and dotted line tells you to make a mountain fold.

The arrow tells you to fold to the opposite side of the paper. An easy way to do this is to flip the paper over, make the fold, and flip it back over again.



A Closer Look

The image in the big circle provides a closer look at the portion of the paper in the smaller circle.



Highlighting Existing Creases

A solid red line highlights a crease you've already made.

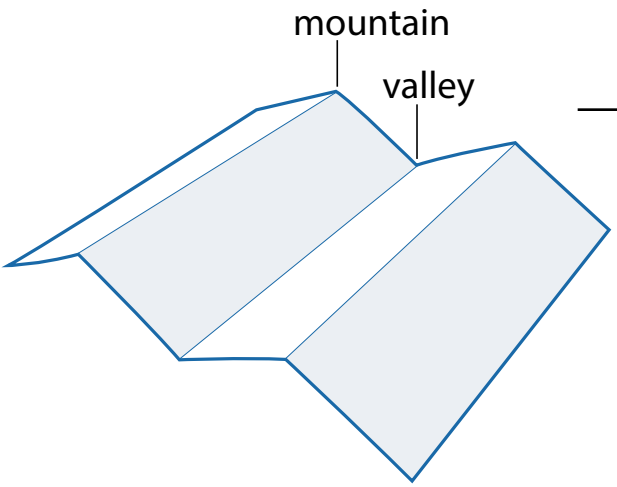
Reference Points

Dots like the ones to the left highlight important reference points for folds.

Fold and Unfold

The arrow above tells you to make a fold and then to open that fold back up in preparation for the next step.

Glossary of Folds



Mountain Folds vs. Valley Folds

Every crease you make falls into one of two categories. It will either be a mountain fold or a valley fold. When viewed from above, mountain folds will point up at you, and valley folds will point down and away from you.

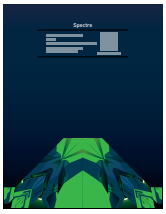
Valley Folds are extremely easy to make. Just fold the paper as you normally would. The resulting crease will be a valley fold.

Mountain Folds are simply the other side of the same coin. To make a mountain fold, turn the paper over and make a valley fold. Then turn the paper back over.

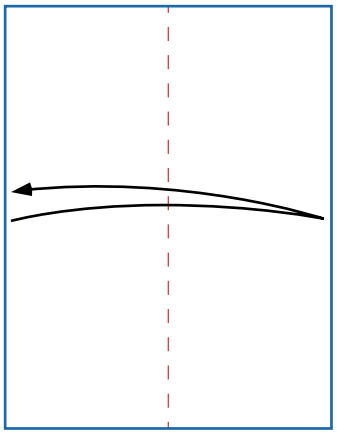
The Waterbomb Base

The Waterbomb base is a common starting point for paper airplanes as well as for other origami models. Use the diagrams below to learn this sequence of folds.

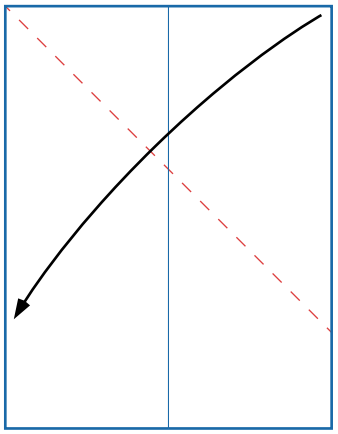
Sentry



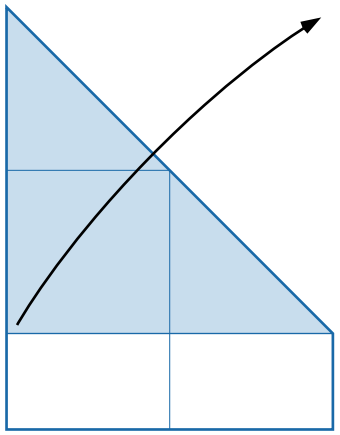
Spectre



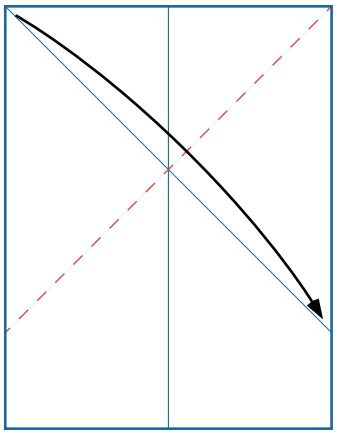
1. Fold the paper in half. Unfold.



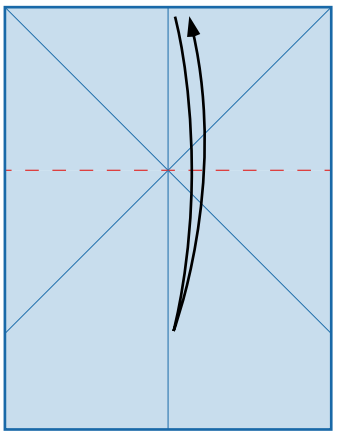
2. Fold the top right corner so that the top edge of the paper lines up with the left edge of the paper. Your crease should go through the top left corner.



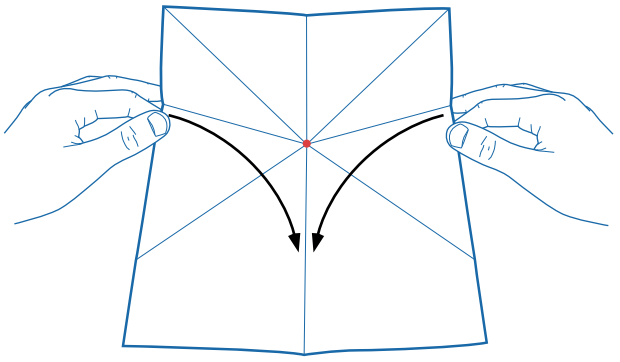
3. Unfold.



4. Repeat steps 2 and 3 on the left side. Turn the paper over.

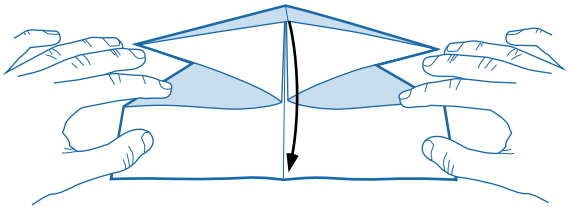


5. Fold the top edge down on the indicated line. Unfold. Turn the paper over.

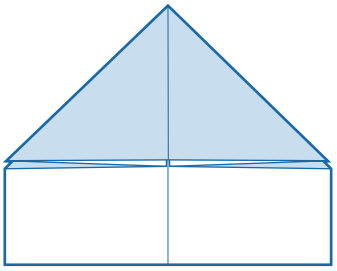


6. Poke the intersection marked by the red dot. Grab the edges of the paper at the crease made in step 5 and pull them down and toward the center crease.

The Waterbomb Base Continued...

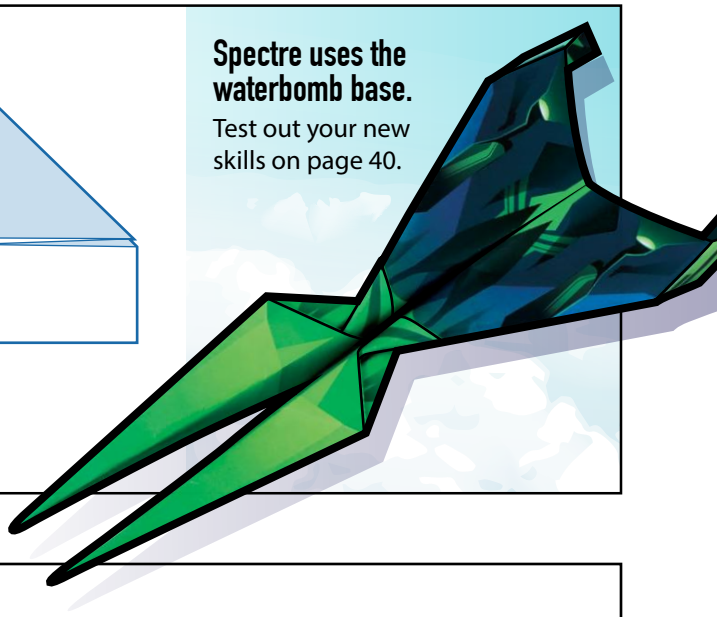


7. Pull the top layer down and flatten the plane to look like the illustration in step 8.



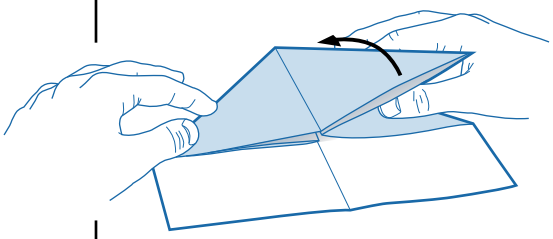
8. Finished!

Spectre uses the waterbomb base.
Test out your new skills on page 40.

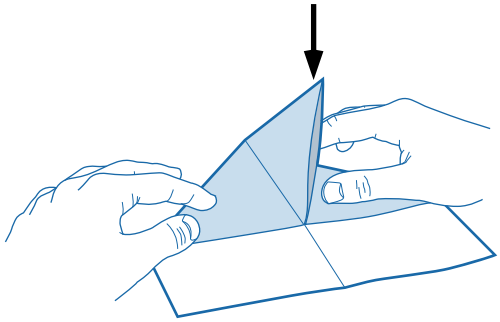


The Squash Fold

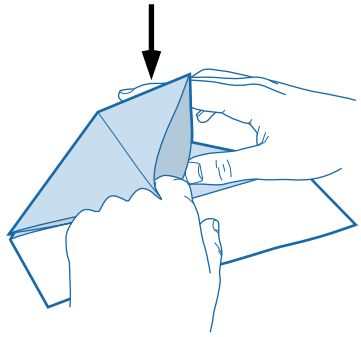
A squash fold is used for flattening flaps composed of more than a single layer. One squash fold will look different from the next, based on the shape of the flap, but they all follow the same basic principles. Though the flap you're squash-folding may be slightly different than the one depicted here, use these illustrations as a guide for completing the fold.



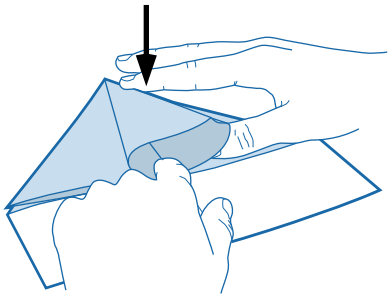
1. Stand the flap that you want to squash fold vertically.



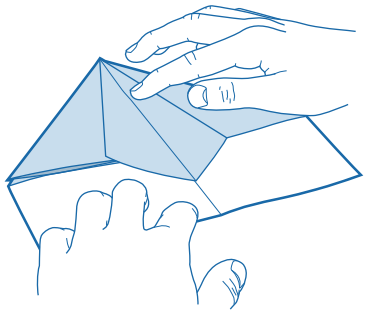
2. Start pressing downward on the crease that joins the layers of the flap.



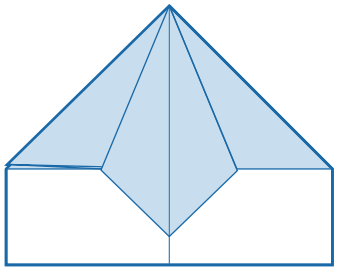
3. Use your finger to open the layers and continue to press down on the crease.



4. Make sure the layers open all the way to the point of the pocket and continue to press down on the crease.



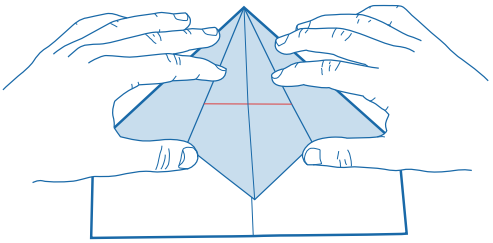
5. Line up the crease you have been pushing with your reference (usually a crease, edge, or corner) and flatten the flap.



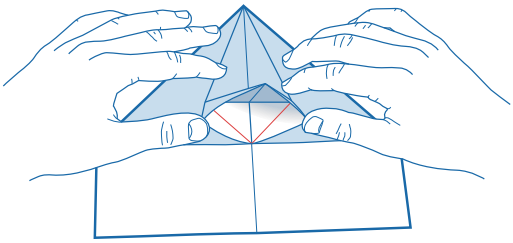
6. Finished!

The Petal Fold

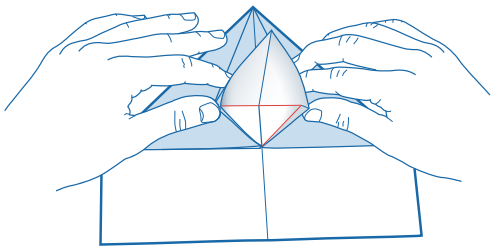
Petal folds can come in a variety of shapes and sizes, but they all follow the same basic idea of changing the shape of a pocket. Use the illustrations below as a guide for completing your petal fold.



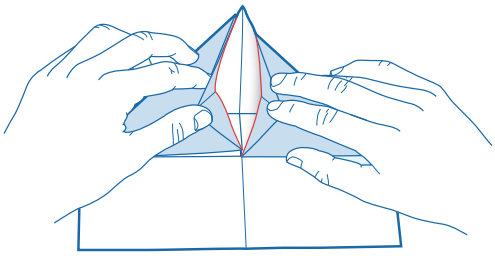
1. Grab the edge of the top flap with your thumbs as the hands show. Swing open this top layer, using the highlighted crease as a hinge.



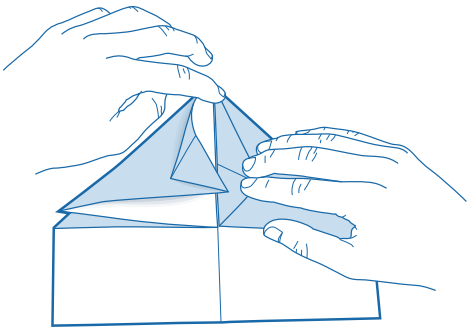
2. As you open the flap, you should notice two diagonal creases (highlighted in red). These will need to be reversed as you continue to open the flap.



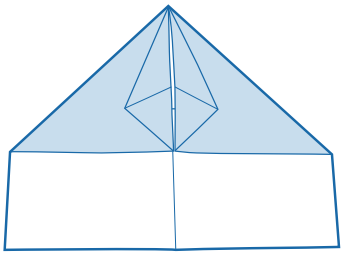
3. Once the flap is standing vertically and is folding on both of the diagonal creases, in addition to the horizontal crease, begin to swing the point of the flap towards the top point of the plane.



4. As the point of the open flap meets the point of the plane, push the raw edges (highlighted in red) in to lie on the center crease. Do one at a time.



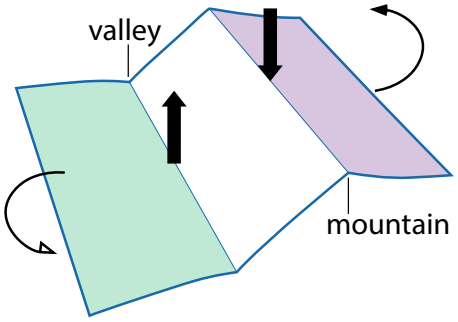
5. Flatten and crease the pocket. Do both sides.



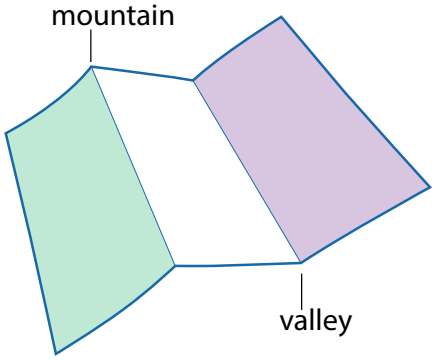
6. Finished!

Reversing A Crease

The process of turning a mountain fold into a valley fold (or a valley fold into a mountain fold) is called reversing a fold or reversing a crease. In the first illustration below, the left crease is a valley and the right crease is a mountain. Think of the creases like hinges on a door. If the door normally opens inward, we want to open it outward to reverse the direction the hinges are bending. If it opens outward, we want to open the door inward. To reverse a crease, all you have to do is bend the "doors" around it in the opposite direction!



1. To turn the left crease into a mountain fold, bend the green section behind the rest of the paper. To turn the right crease into a valley fold, bend the purple section on top of the rest of the paper.

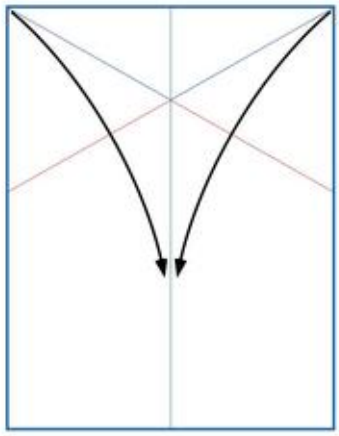


2. Finished! You've reversed both creases.

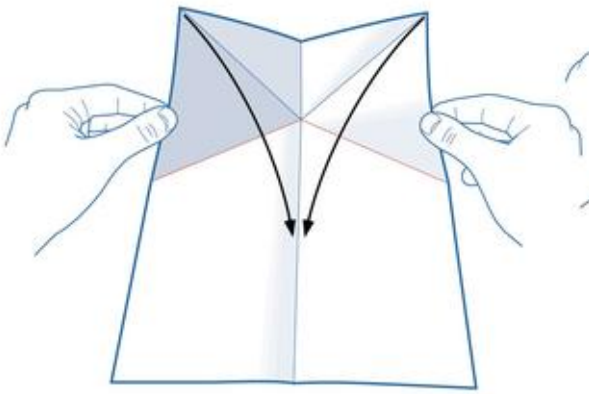
Voyager uses a rabbit ear fold.
Test out your new skills on page 30.

The Rabbit Ear Fold

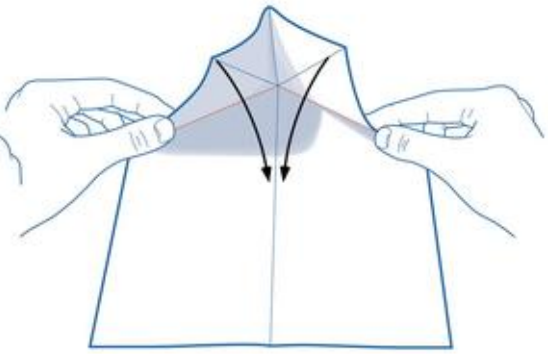
A rabbit ear fold is performed by simultaneously folding on two diagonal creases that intersect one another. This will ultimately create a flap in the paper known as a rabbit ear. The angle and placement of the diagonal creases can vary, changing the shape of the rabbit ear created by folding in on them. The diagrams below illustrate just one possibility, but you can use them as a guide for completing any rabbit ear fold.



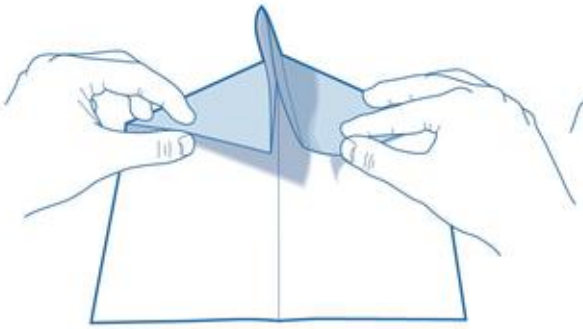
1. Fold in on the highlighted portions of each diagonal crease simultaneously.



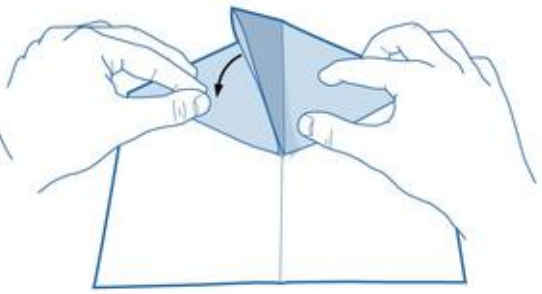
2. Continue to fold in on the highlighted portions of each crease.



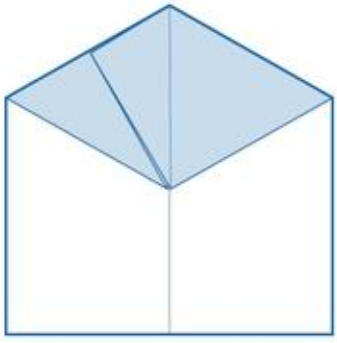
3. Again, continue to fold in on the highlighted creases. A flap should begin to form in the top center of the paper.



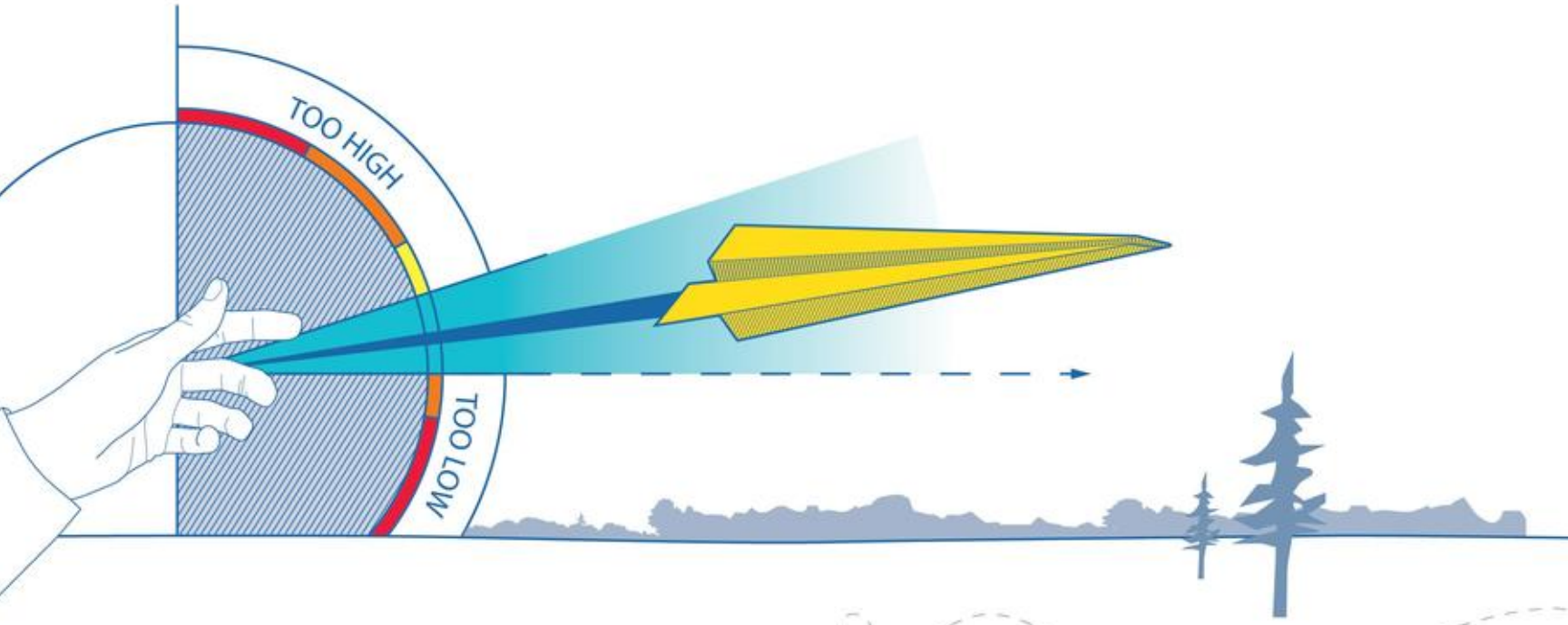
4. Flatten the outer layers so that the rabbit ear is standing vertically.



5. Fold the rabbit ear to one side.



6. Finished!



Troubleshooting

Often, newly-folded planes do not fly well the first time you throw them. Don't worry. With a few tips, you can dramatically improve the flight of your paper airplane and unlock its full potential!

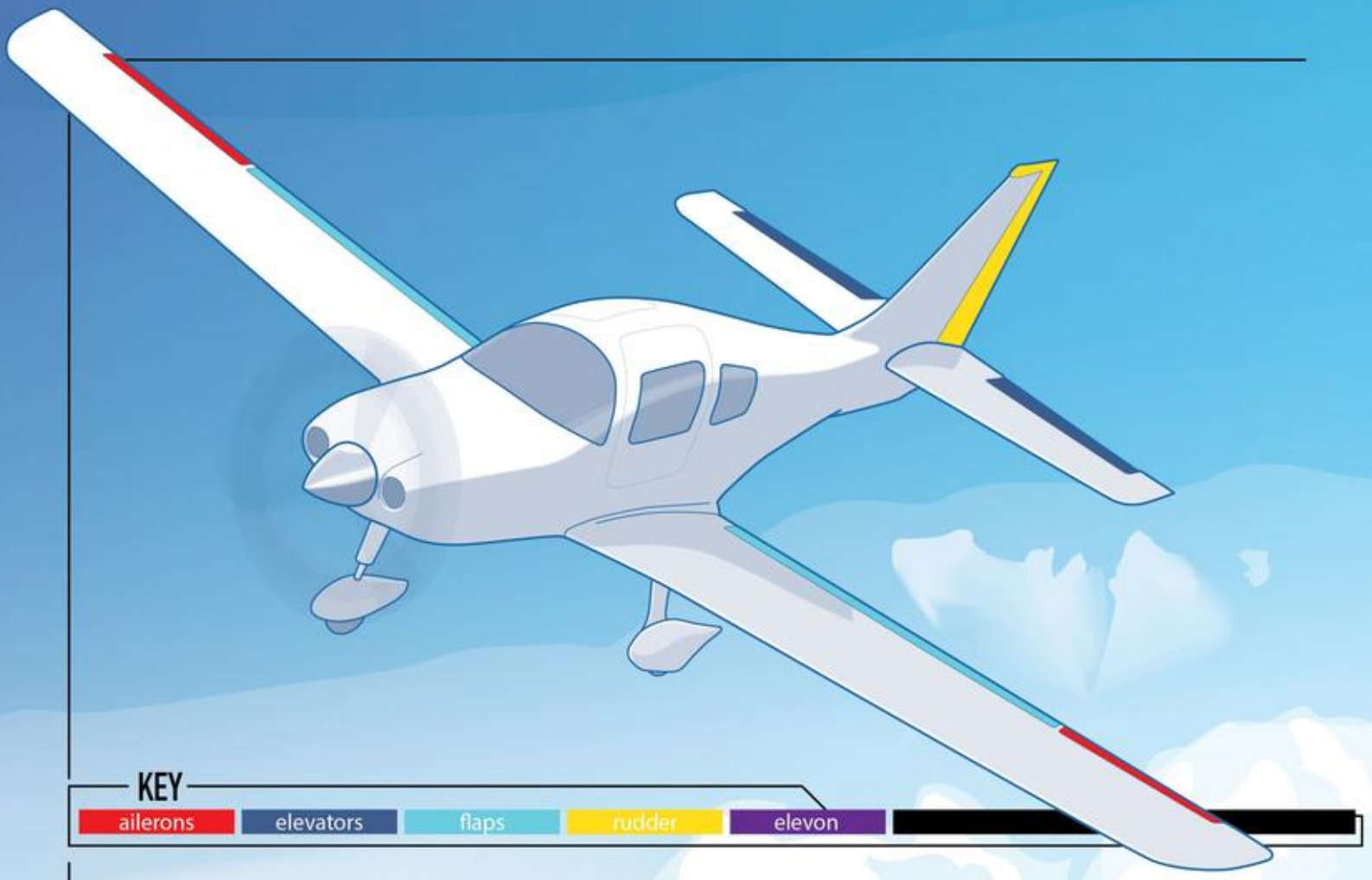
If a plane has been folded well (the creases are sharp, the wings are symmetrical, and the step-by-step diagrams have been followed carefully) but it still does not perform properly, then there are two likely culprits. First, your throwing technique may not suit the plane. In this book, each plane comes with a throwing tip at the end of its folding diagrams. The tip can help improve your throwing technique, thereby improving the performance of your plane. These throwing tips will give you specific advice for each plane, but if you keep reading here, I'll give you some general tips as well.

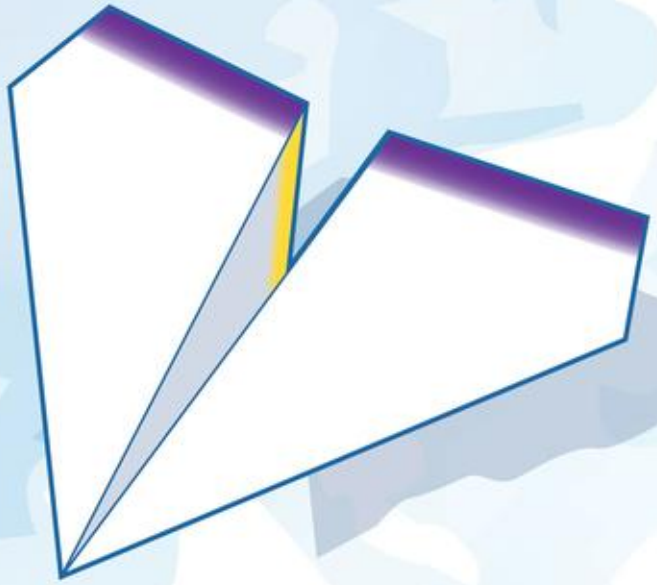
The second and equally likely culprit is that your plane's control surfaces need to be adjusted to compensate for slight imperfections in your plane. In the next few pages, I'll teach you about control surfaces on real aircraft, and then we can use that knowledge to improve the performance of our paper aircraft.

Throwing Tips

Throwing a paper airplane requires a different technique than throwing a baseball or a football, and different airplanes require different throwing techniques. These tips should help improve your flights:

- Make sure you are throwing the plane level to the ground or slightly upward unless the throwing tip suggests otherwise. (Refer to the illustration above.)
- Wing size will generally indicate how hard you should throw the plane in order to achieve optimal flights. If a plane has narrow wings, throw it hard for fast flights. If it has wide wings, throw it gently for slow and graceful glides.
- Check for damage and symmetry after each toss. Throw, check, and make necessary adjustments (which you will learn how to do in the next section).





Paper airplanes don't have flaps, and most use elevons instead of distinct elevators and ailerons.

Control Surfaces

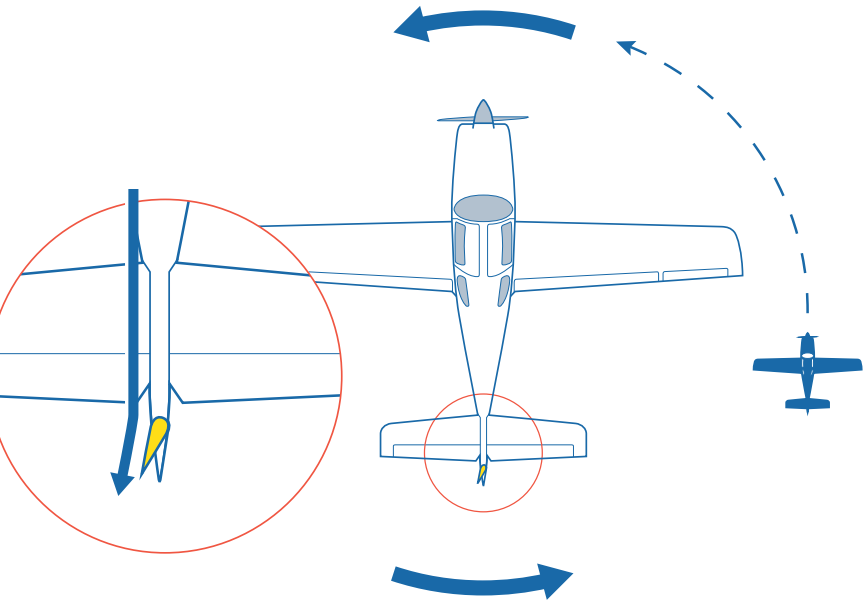
Control surfaces are movable parts used to control the flight of real airplanes. One example you might be familiar with is a rudder. A rudder is a vertical control surface. By adjusting the rudder, a pilot can make his plane turn left or right in the direction he wishes to travel. Understanding how this works on real planes will help us to understand the flight of our paper airplanes. But first, let's familiarize ourselves with the various control surfaces.

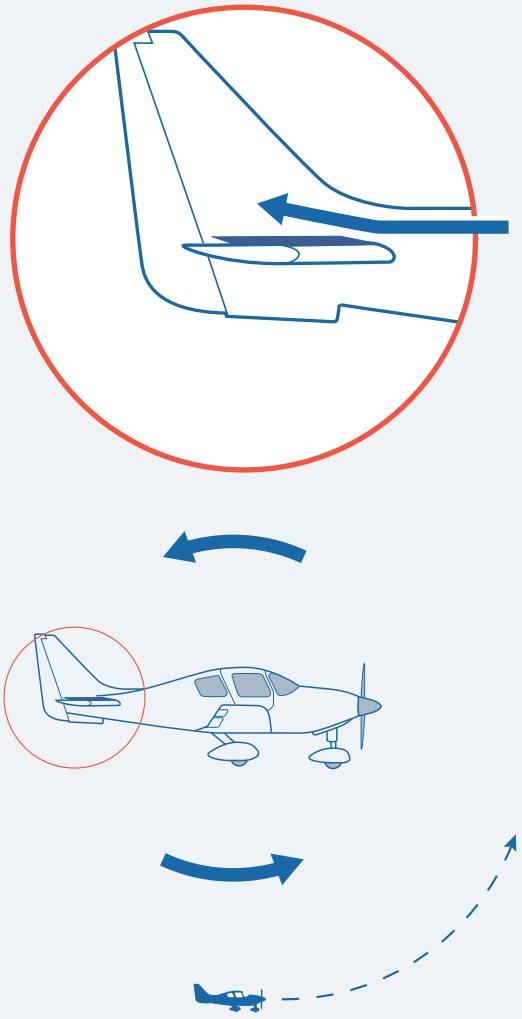
- **Rudder:** controls left and right movement (yaw)
- **Elevator:** controls up and down movement (pitch)
- **Aileron:** controls rolling (roll)
- **Elevon:** functions as both an elevator and an aileron
- **Flaps:** increase the surface area of a wing, slow the plane, and increase lift

By adjusting control surfaces, pilots have control over every aspect of a plane's movement. They can make the plane fly straight or make the plane turn. They can make the plane fly level or make the plane gain or lose altitude. They can even make the plane do a barrel roll. Let's take a look at how these control surfaces work:

Rudder

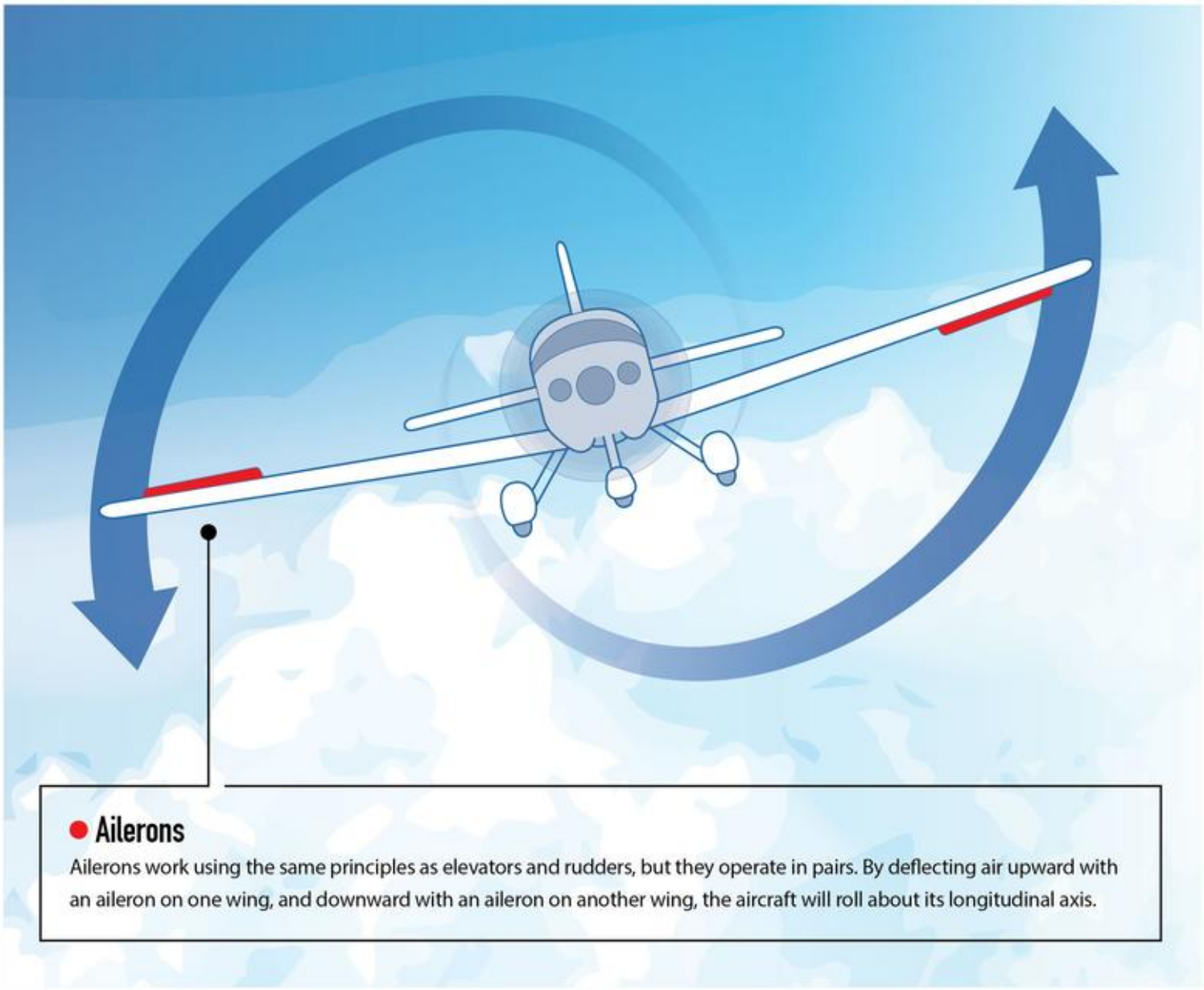
The rudder is located on a vertical stabilizer of a plane. In real aircraft, this vertical stabilizer is usually a tail fin, but on many paper airplanes the only vertical stabilizer is the body of the folded plane. A pilot uses controls to operate the rudder of the plane. In the diagram below, the rudder is projecting toward the left side of the tail. As air hits the rudder, it deflects to the left, creating an opposing force that pushes the rear of the plane to the right. As the tail of the plane moves to the right, the nose of the plane moves to the left because the plane rotates around its center of gravity. So to turn left from the pilot's perspective, he or she sets the rudder to project toward the left side of the tail, increasing drag on the left side of the plane. If the pilot wants to turn right, he or she sets the rudder to project toward the right side of the tail.





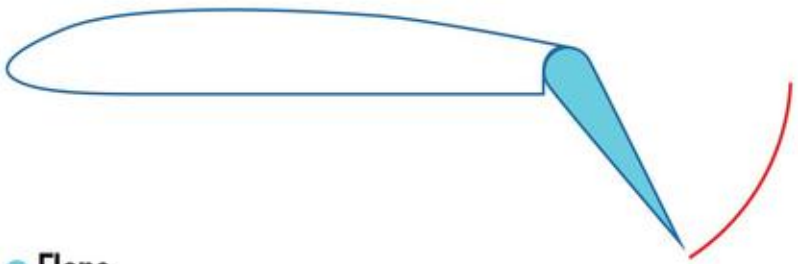
Elevator

Elevators operate using the same principles as rudders. On real planes, elevators are usually located on horizontal portions of the tail at the rear of the plane. If a pilot operates the elevators to project above the tail wing, air will deflect upward, forcing the tail of the plane downward. As the tail is forced down, the nose of the plane will move upward, because the plane is again rotating around its center of gravity, this time on a different axis. As the plane's nose rotates upward, the aircraft will gain altitude.



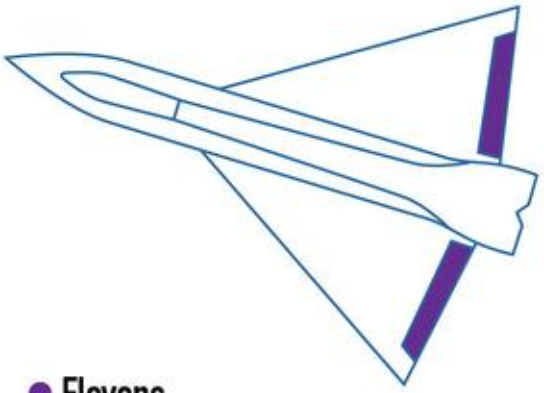
Ailerons

Ailerons work using the same principles as elevators and rudders, but they operate in pairs. By deflecting air upward with an aileron on one wing, and downward with an aileron on another wing, the aircraft will roll about its longitudinal axis.



Flaps

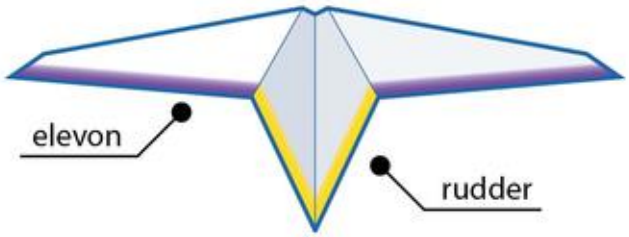
Flaps extend from the back of the wing to increase its surface area or to increase the camber of the wing. This increases the amount of lift a wing generates, which helps real aircraft take off and land at lower speeds. The trade off for this increased lift is an increase in drag as well. For this reason, flaps are retracted once a plane reaches its cruising speed so that it will fly more efficiently.



Elevons

Elevons are control surfaces that function both as an elevator and as an aileron — they control both the pitch and roll of an aircraft. On the paper airplanes in this book, we will be working with elevons rather than with either elevators or ailerons.

Common Problems
and How to Fix Them



Rear View

Problem: Your paper airplane is diving.

Solution: Bend the back edges of the wings slightly upward to match the illustration. This applies "up elevator." Small adjustments go a long way.

Before:

After:

Problem: Your paper airplane is turning (left).

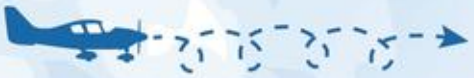
Before:

After:

Solution: If your plane is turning left, bend the right edge of the fuselage outward to match the illustration. This applies "right rudder" and will help the plane fly straight. If your plane is turning right, bend the left edge instead.

Problem: Your paper airplane is spiraling (clockwise).

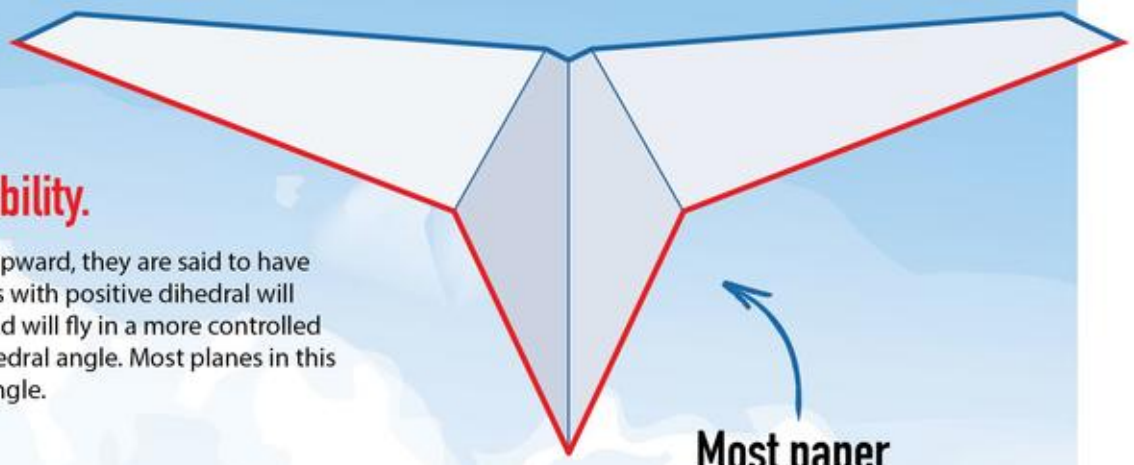
Solution: Bend the back edge of the left wing slightly upward to match the illustration. If your plane spirals counter-clockwise, bend the right wing slightly upward. The farther the bend is from the center of the wing, the greater its effect will be.

Before: 

After:

Positive Dihedral Angle improves stability.

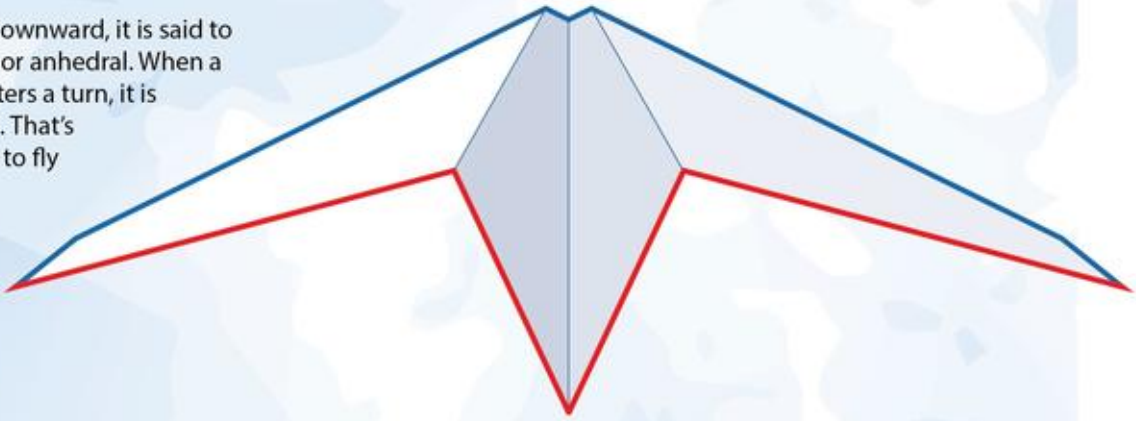
If the wings of a plane angle upward, they are said to have positive dihedral angle. Planes with positive dihedral will tend to self correct in flight and will fly in a more controlled manner than planes with anhedral angle. Most planes in this book fair best with dihedral angle.

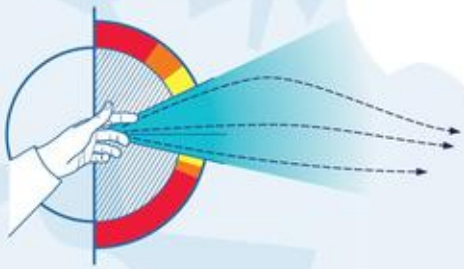


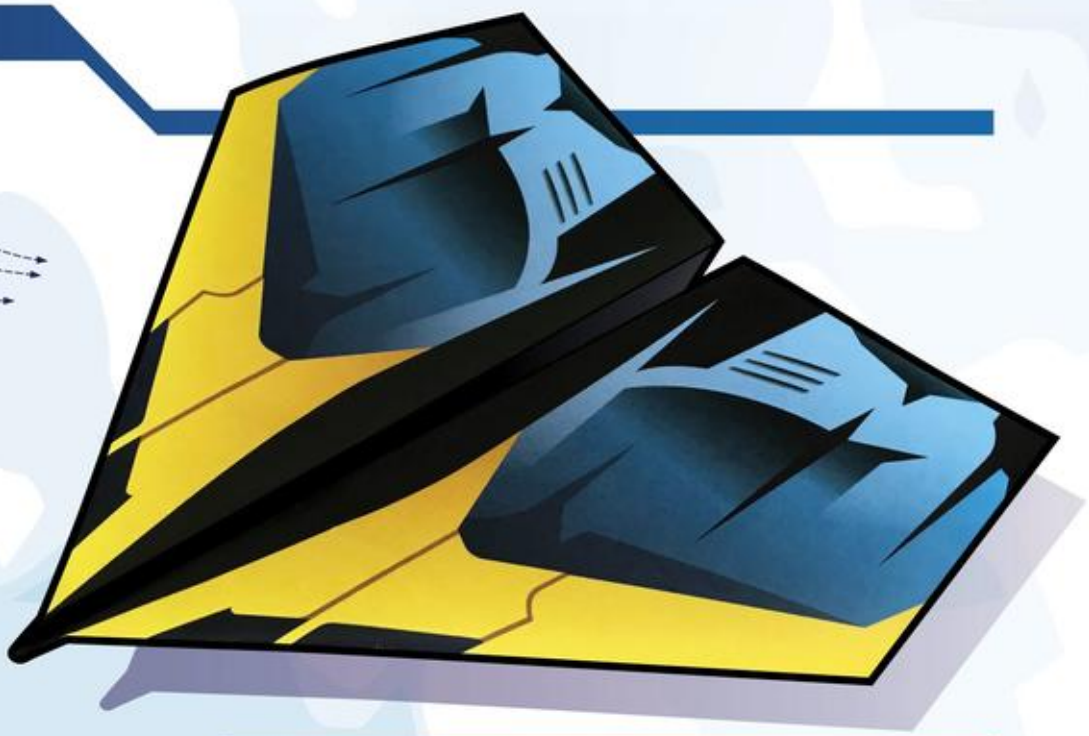
Most paper airplanes should have dihedral angle.

Negative Dihedral (Anhedral) reduces stability.

If the wings of a plane angle downward, it is said to have negative dihedral angle, or anhedral. When a plane with anhedral wings enters a turn, it is inclined to remain in that turn. That's partly why Zoomerang is able to fly in a circle back to you!







Wide Glider

Type: Glider **Difficulty:** Easy

Speed

Glide

Accuracy

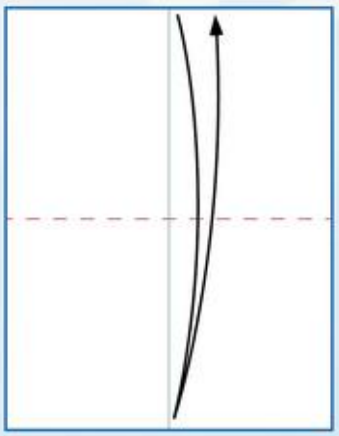
Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-01-wideglider

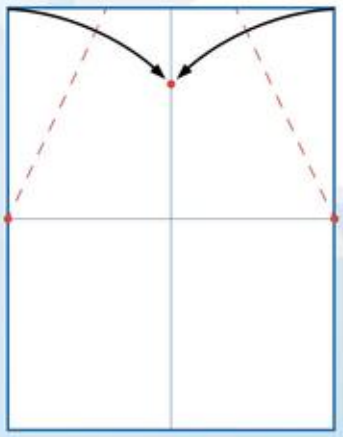
If some of the planes in this book look intimidating, or if you're unsure where to begin, there's no better place to start than with this excellent plane. Wide Glider is easy to fold and boasts an incredible glide ratio. Beginners will appreciate the ease of folding, but all will appreciate its grace in flight!

8.5 in x 11 in

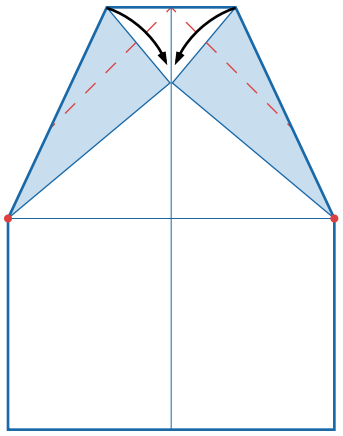
1. Fold the paper in half. Unfold.



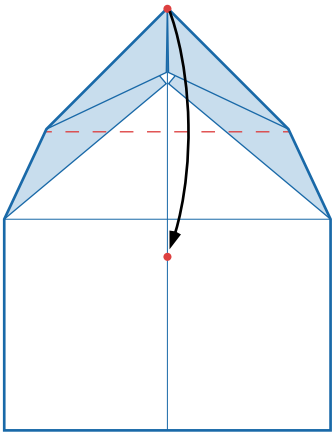
2. Fold the paper in half top to bottom. Unfold.



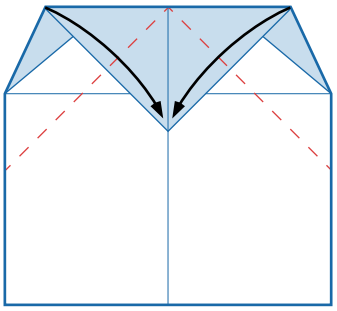
3. Fold the corners in to meet the center point shown. The creases should intersect the left and right edges of the page at the same point as the horizontal center crease.



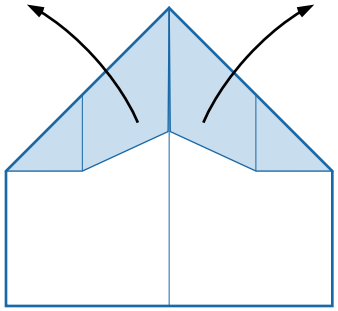
4. Fold the top corners in to meet the center crease and form a point at the top of the plane.



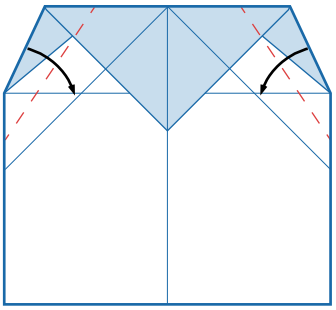
5. Fold the top point down so that it is about one inch below the horizontal center.



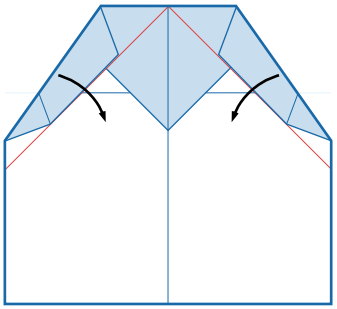
6. Fold the top corners in to land on the center and form a new point at the top of the plane.



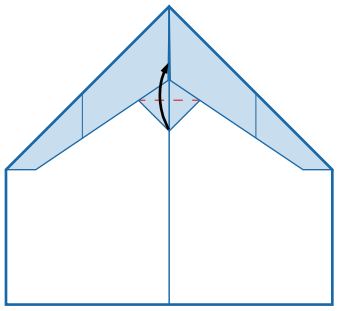
7. Unfold.



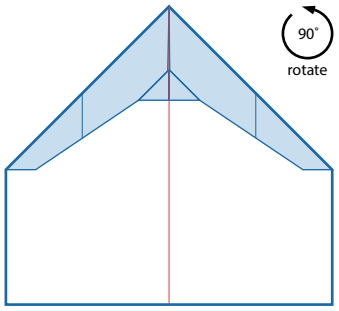
8. Fold the edges in to meet the creases made in step 6.



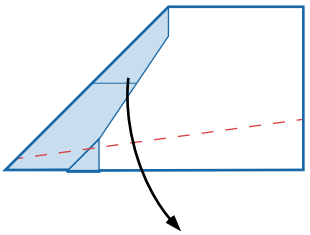
9. Fold in on the existing creases to return to a point.



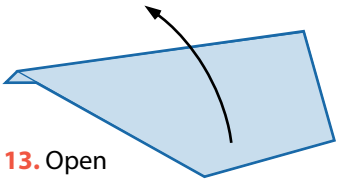
10. Fold the bottom point on the indicated line to form a triangle that will later lock the layers together.



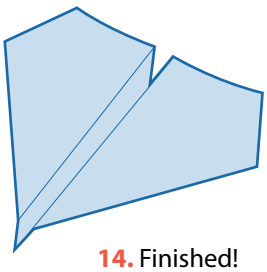
11. Mountain fold the paper in half on the existing center crease. Rotate 90 degrees.



12. Fold the wings on the indicated line, starting above the nose of the plane, and creasing through the triangular lock.

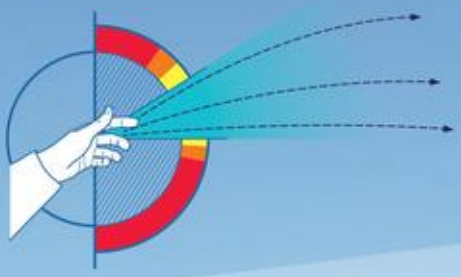


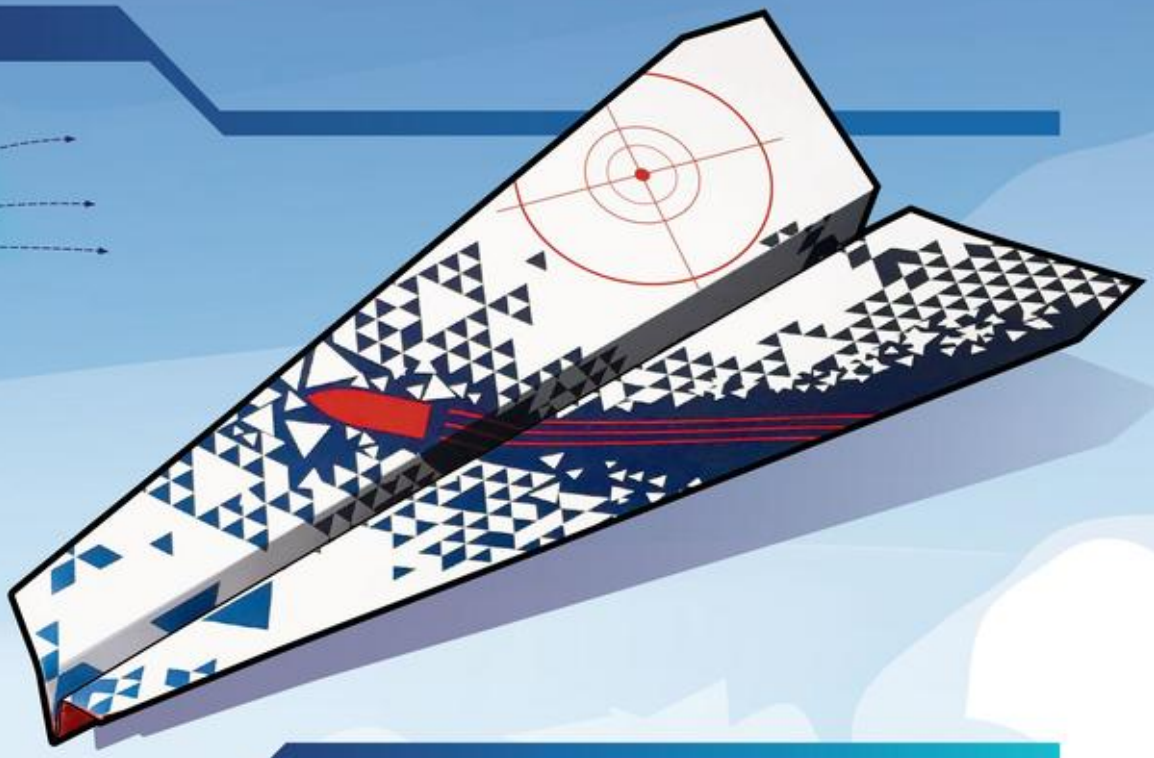
13. Open the wings.



14. Finished!

Throwing Tip: Launch Wide Glider with gentle to moderate force and watch it glide across the room! Its wide wings are best suited for slow flights, but its strong leading edges give it enough rigidity to sustain the forces of higher speeds if you want to push its limits!





Sniper

Type: Dart **Difficulty:** Easy

Speed

Glide

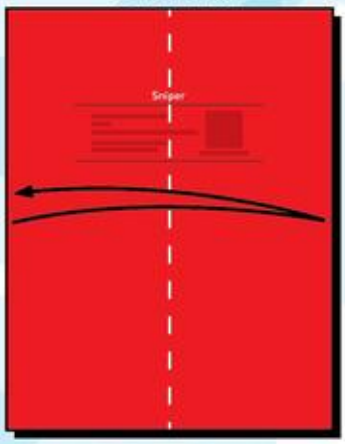
Accuracy

Click the QR Code to watch a video tutorial for this plane!

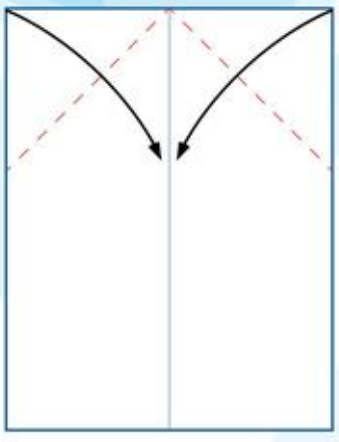
Or go to foldableflight.com/ipa-02-sniper

Sniper is a deadly accurate paper airplane. While it's based on the classic dart that you've probably folded before, it contains several improvements that make it more consistent and aerodynamic. Sniper's center of gravity has been moved to be closer to the center of lift, and pockets lock all of the layers together to form a streamlined design. It's easy to fold and flies like a boss, with a range of up to 60 feet. Give it a fold and see for yourself!

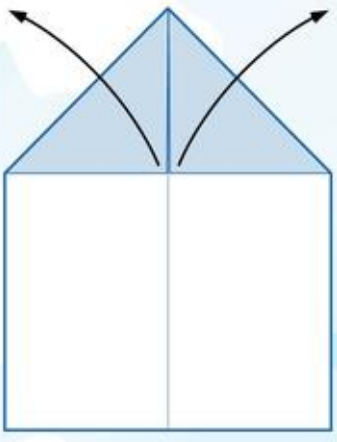
8.5 in x 11 in



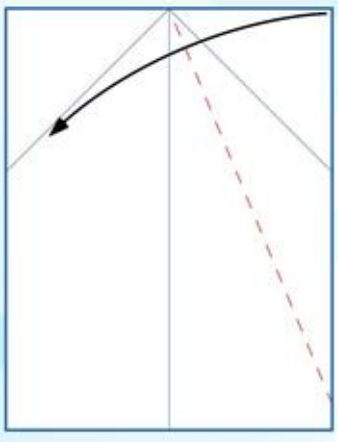
1. Fold the paper in half. Unfold.



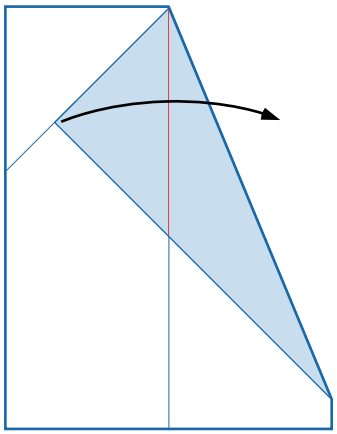
2. Fold the top corners in to the center to form a point.



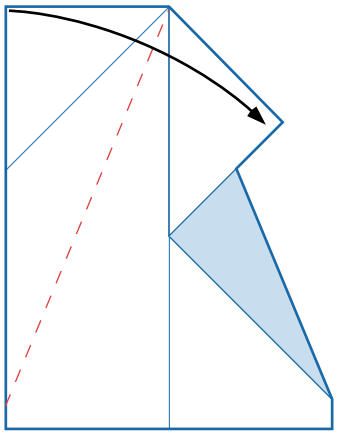
3. Unfold.



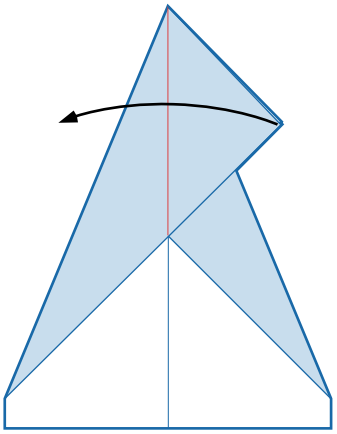
4. Fold the top right corner on the indicated line. The top edge of the paper should land on the left diagonal crease, and the right diagonal crease should land on the center crease.



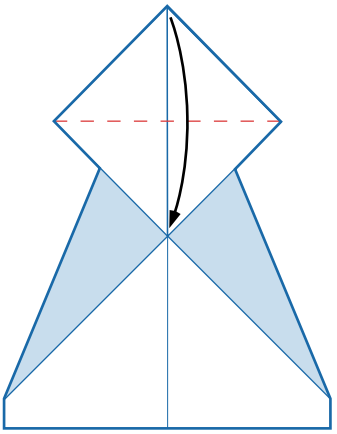
5. Reverse the existing crease on the top layer.



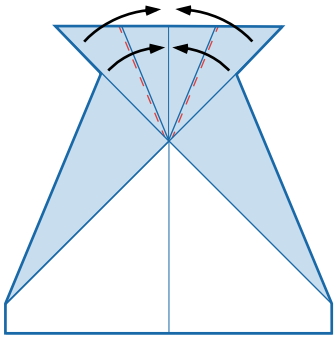
6. Fold the left corner so it lands on and lines up with the right flap.



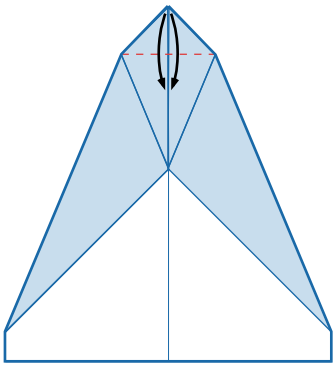
7. Reverse the existing crease on the top layer.



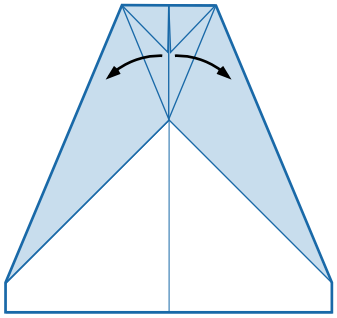
8. Fold the top point of the plane down to the bottom point of the diamond.



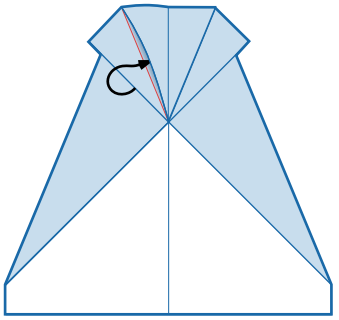
9. Fold the outer flaps in to the center, using the top layer as a guide.



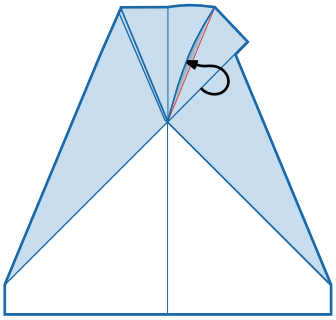
10. Fold the tops of the upper flaps down along the indicated lines until they are even with the top edge of the layer beneath.



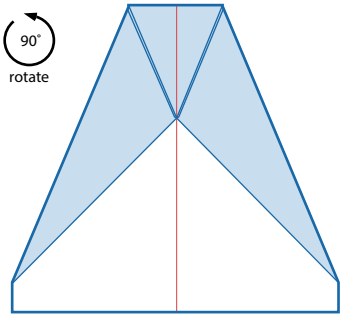
11. Unfold the crease made in step 9.



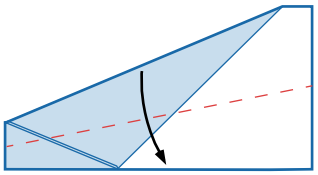
12. Tuck the left flap into the pocket created by the top layer by folding in on the existing crease, highlighted in red .



13. Repeat step 12 on the right side.



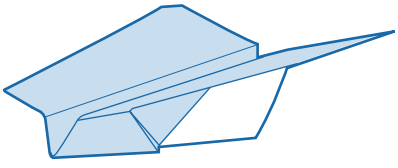
14. Mountain fold the plane in half on the existing crease. Rotate the plane 90 degrees counter clockwise.



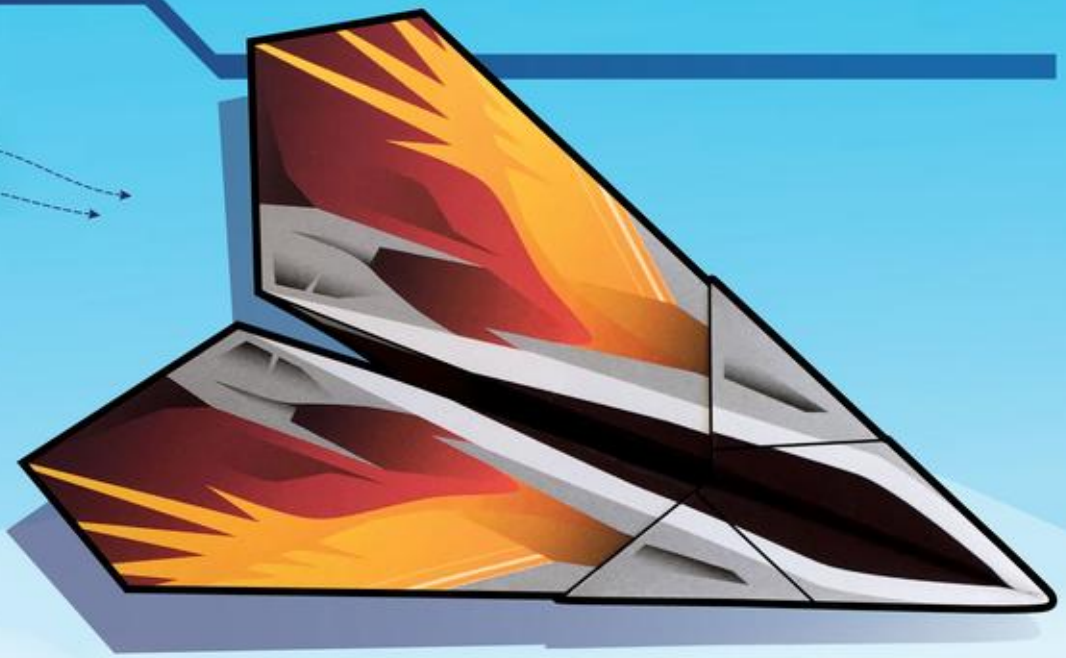
15. Fold each wing so that it is flush with the bottom edge of the plane.

16. Open the wings.

Throwing Tip: The Sniper is a dart with a surprisingly good glide ratio. You can throw it as hard as you want, but it will fly well at any speed, and it's deadly accurate!



17. Finished!



Arrowhead

Type: Dart **Difficulty:** Easy

Speed

Glide

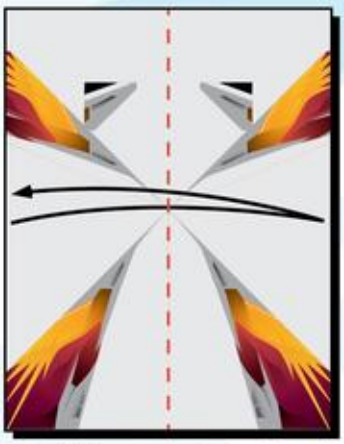
Accuracy

Click the QR Code to watch a video tutorial for this plane!

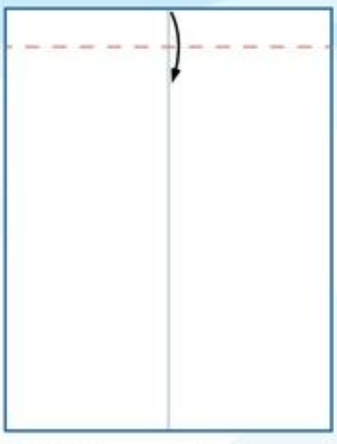
Or go to foldableflight.com/ipa-03-arrowhead

Arrowhead features a unique locking mechanism that holds all of the layers tightly to the plane, which makes it more aerodynamic than classic designs. The design is also a little bit nose heavy, which is part of why it flies so far. So, once you're done folding, you may need to bend the back edges of the wings up very slightly to improve its balance and increase its range. With a powerful throw, this plane can fly over 100 feet!

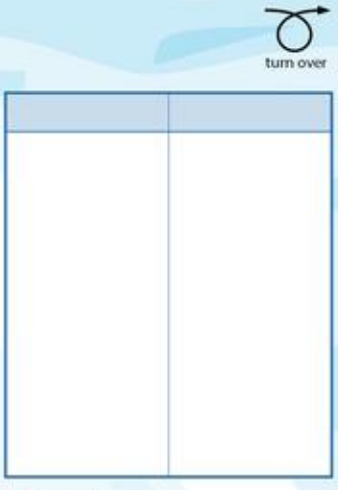
8.5 in x 11 in



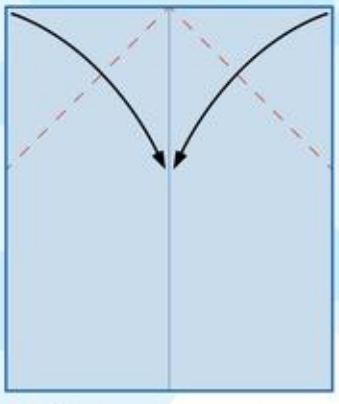
1. Fold the paper in half. Unfold.



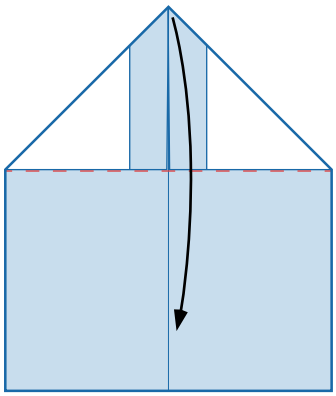
2. Fold the top inch of the paper down.



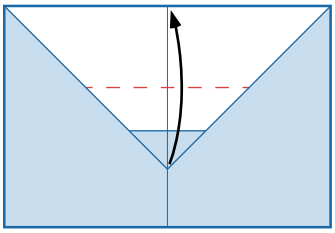
3. Turn the paper over.



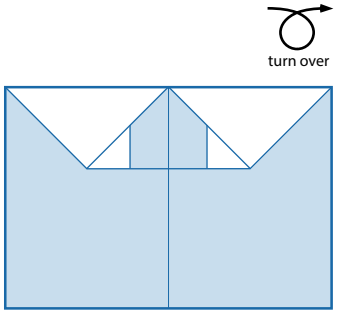
4. Fold the top corners in to the center to form a point.



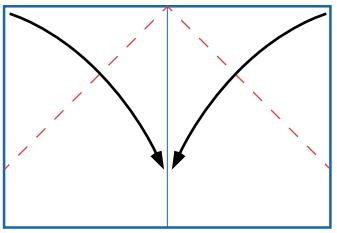
5. Fold the top section down on the indicated line.



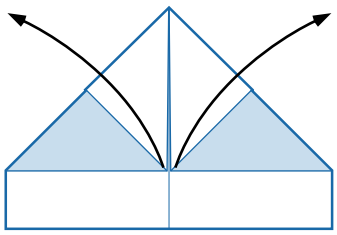
6. Fold the point of the triangle back to the top.



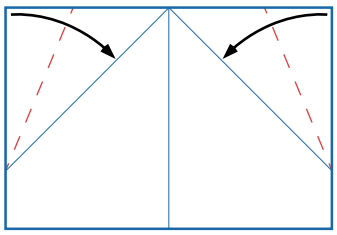
7. Turn the paper over.



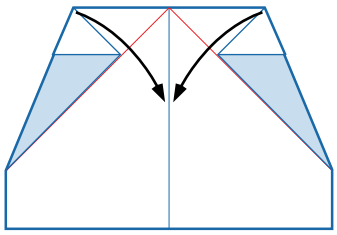
8. Fold the top corners in to the center to form a point.



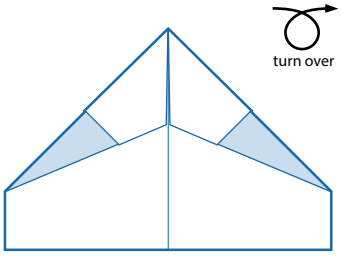
9. Unfold



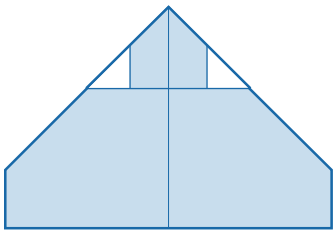
10. Fold the outer edges in to land on the creases you made in step 8.



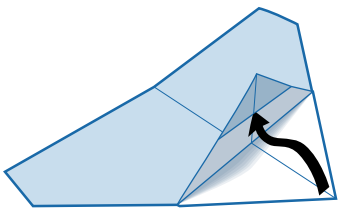
11. Fold in on the creases you made in step 8.



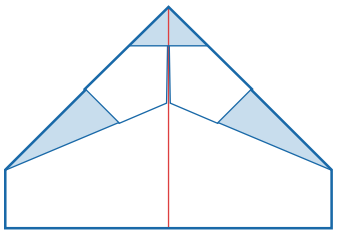
12. Turn the paper over.



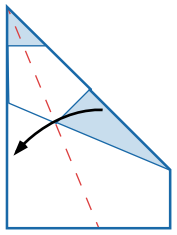
13. Stand the top flap up and rotate the plane to match the illustration in step 14.



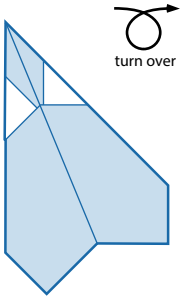
14. Pick the plane up and tuck the nose into the pocket as shown. Lay the plane back on the table to match the illustration in step 15.



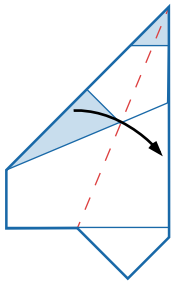
15. Mountain fold the plane in half on the existing crease.



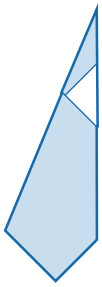
16. Fold the wing to land on the left edge of the plane.



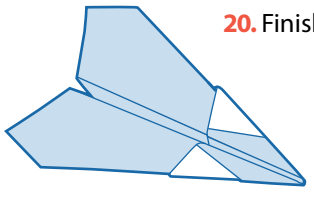
17. Turn the plane over.



18. Fold the second wing to match the first.

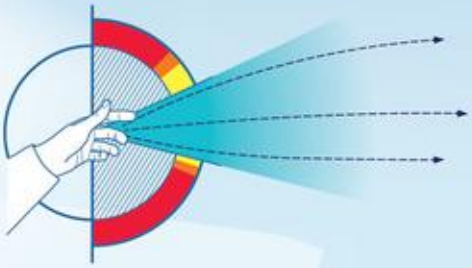


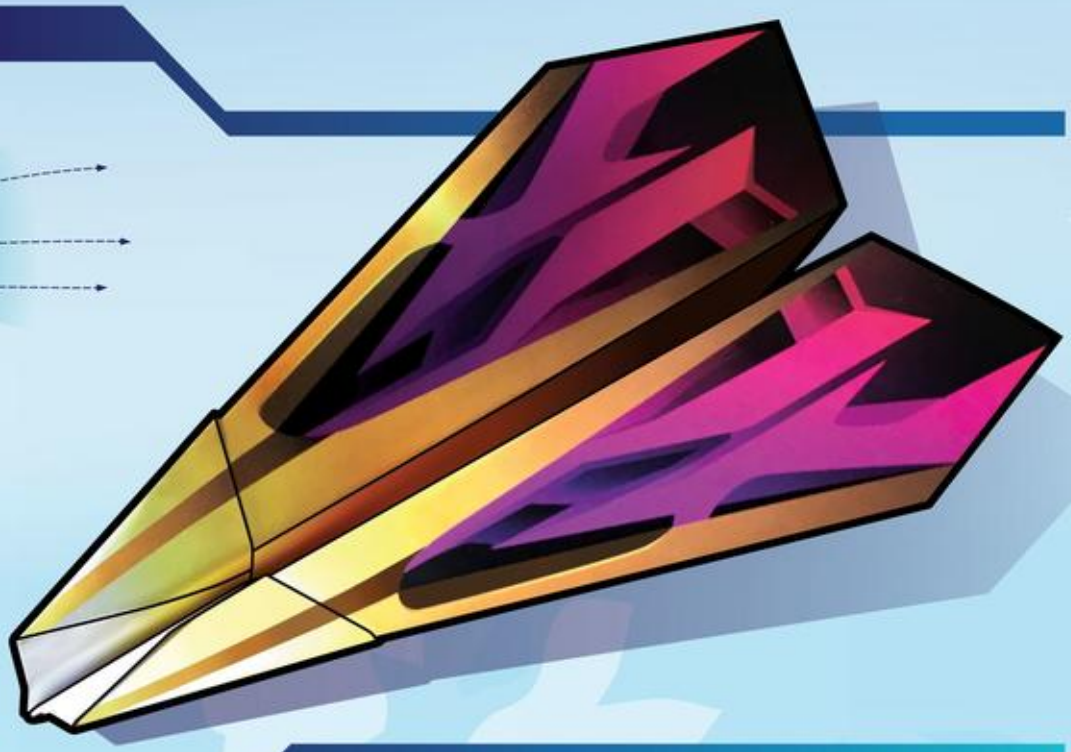
19. Open the wings.



20. Finished!

Throwing Tip: Arrowhead is as easy to throw as it is to fold. Angle its wings upward slightly so the plane looks like a "Y" from behind. Then bend the back edges of the wings up slightly, and throw it as hard as you can muster. Thanks to its strong wings and aerodynamic profile, Arrowhead will soar to the far side of the gym!





Bandit

Type: Dart **Difficulty:** Easy

Speed

Glide

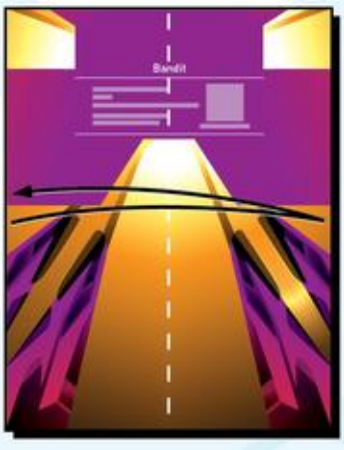
Accuracy

Click the QR Code to watch a video tutorial for this plane!

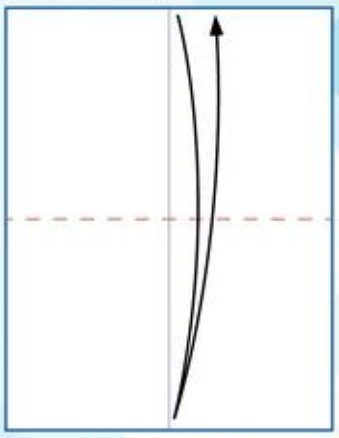
Or go to foldableflight.com/ipa-04-bandit

Bandit is an excellent dart that will surprise you with its glide ratio. While its wings are narrow, the placement of its center of gravity allows it to soar similarly to a glider. A locking mechanism cleverly holds the layers of the plane together to make it more aerodynamic than many you'll encounter. All of these factors combine to give Bandit a maximum range of over 80 feet!

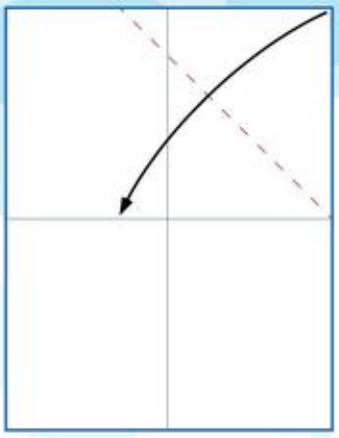
8.5 in x 11 in



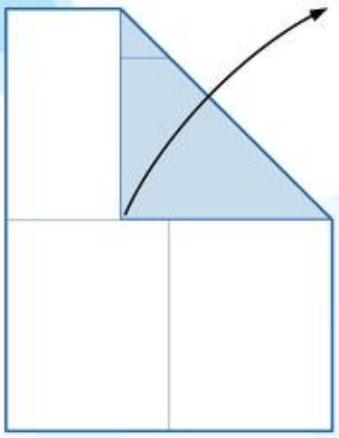
1. Fold the paper in half. Unfold.



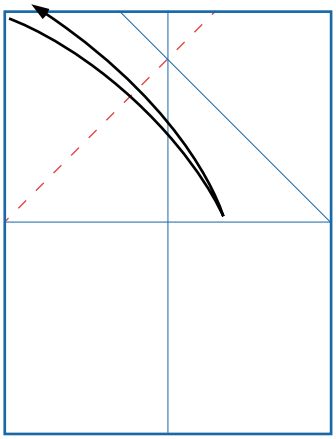
2. Fold the paper in half the other way. Unfold.



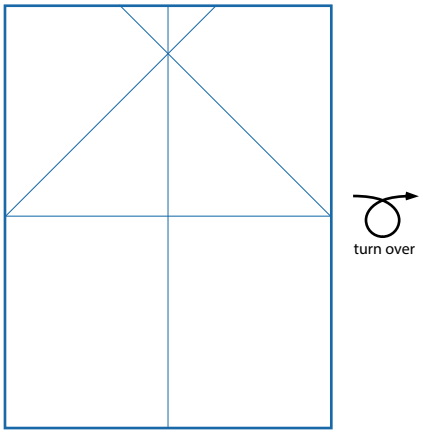
3. Fold the right corner down so that the right edge of the paper lines up with the crease made in step 2.



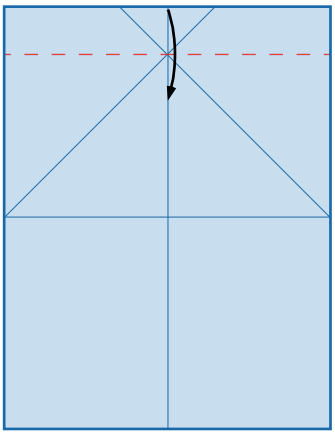
4. Unfold.



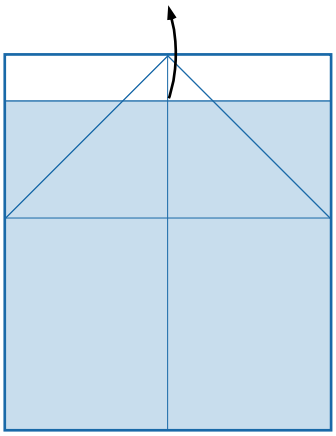
5. Repeat steps 3 and 4 on the left side.



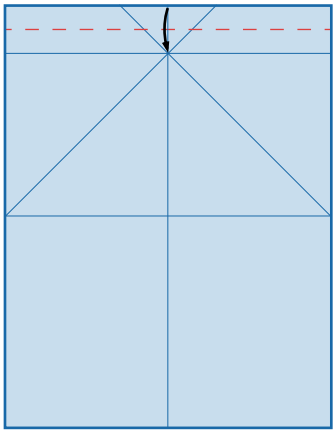
6. Turn the paper over.



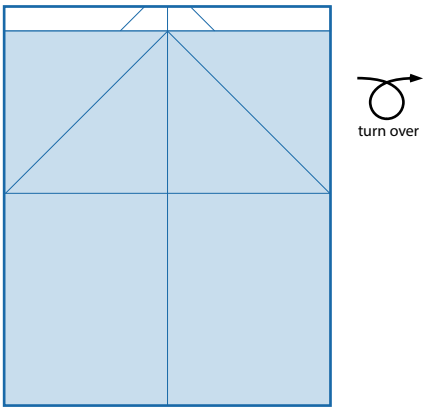
7. Fold the top of the paper down, creasing through the intersection as shown.



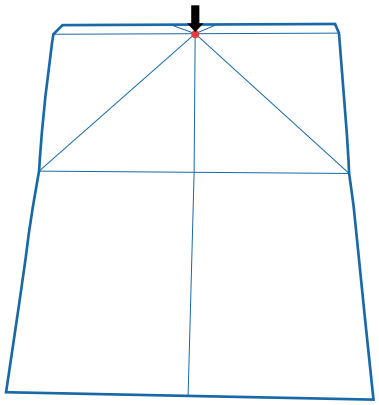
8. Unfold.



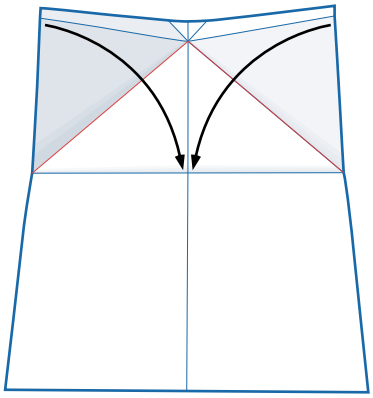
9. Fold the top edge to the crease made in step 7.



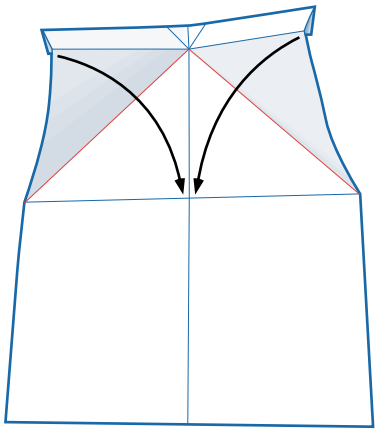
10. Turn the paper over.



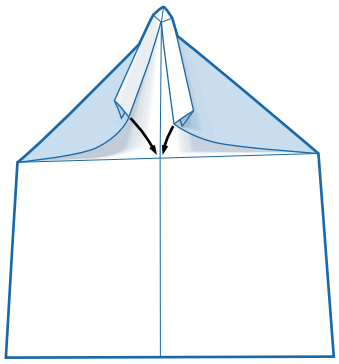
11a. Poke the intersection marked by the red dot. This should make the sides of the paper pop up as illustrated in step 11b.



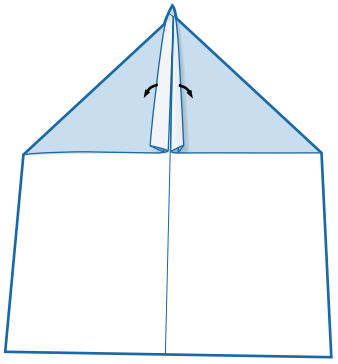
11b. Begin folding in on the creases highlighted in red.



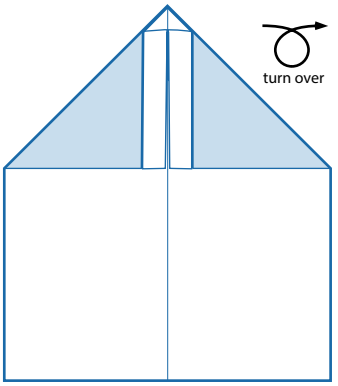
11c. Continue folding in on the creases highlighted in red.



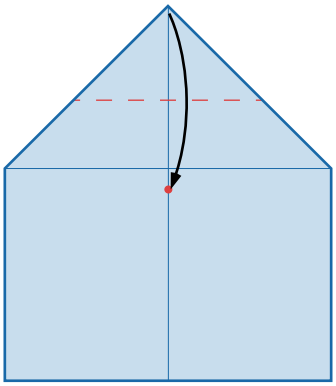
11d. Lay the triangular flaps of the paper flat on the table to match step 11e.



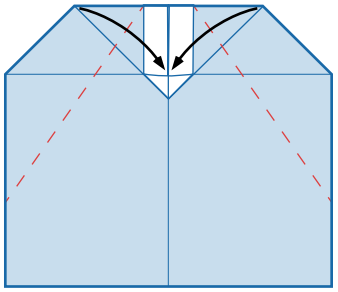
11e. Flatten the central flaps to match the illustration in step 12.



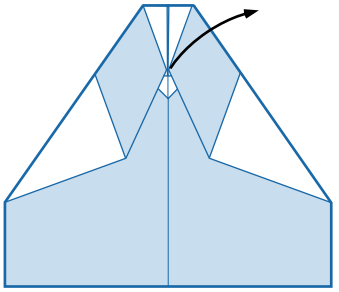
12. Turn the paper over.



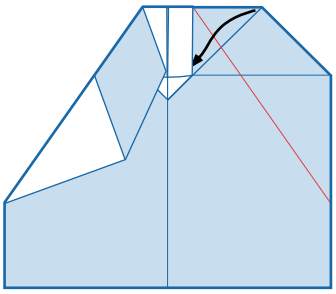
13. Fold the top point down to match the illustration in step 14. The horizontal edge of the triangular pocket on the other side of the paper should land on the horizontal crease on this side.



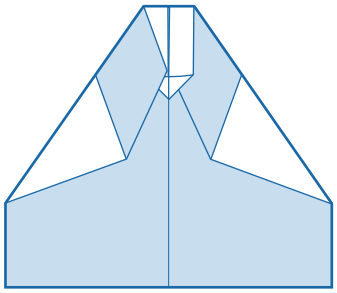
14. Fold the top corners to the center. Note that each crease will start at an edge of the topmost layer.



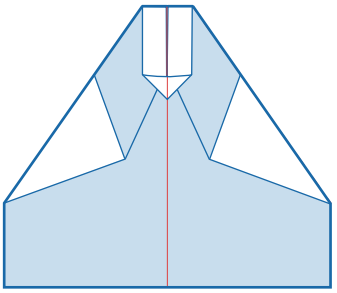
15. Unfold the right flap.



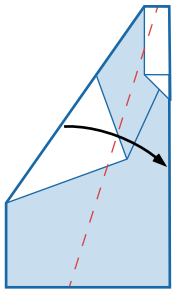
16. Fold the right flap in on the existing crease, but tuck it under the topmost layer to match the illustration in step 17.



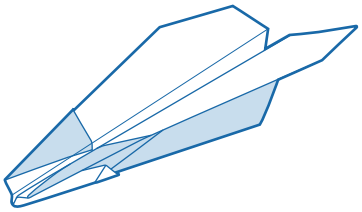
17. Repeat steps 15 and 16 on the left side.



18. Mountain fold the paper in half along the existing crease.

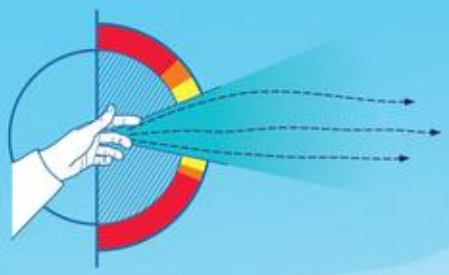


19. Fold each of the wings so that the diagonal edge lines up with the vertical edge.



20. Finished!

Throwing Tip: Bandit doesn't care if you throw it hard or throw it gently. It's going to fly across the room either way. Your best throwing angles will be between 0 and 45 degrees.



Nakamura Jet

Type: Hybrid **Difficulty:** Easy

Speed

Glide

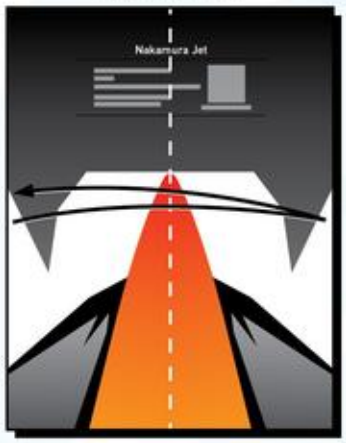
Accuracy

Click the QR Code to watch a video tutorial for this plane!

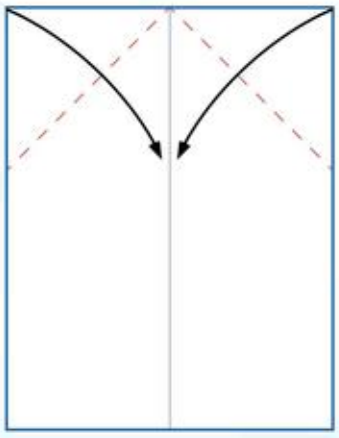
Or go to foldableflight.com/ipa-05-nakamurajet

Nakamura Jet is based on the classic paper airplane designed by Eiji Nakamura, known as the Nakamura Lock. This variation has stronger leading edges than the Nakamura lock, meaning it can withstand harder throws and higher speeds. It treads the line between a dart (a plane that is fast, with narrow wings) and a glider (a plane that is slower, with wider wings) so it falls into the category of hybrids, which are often excellent fliers. Nakamura Jet is no exception to that rule, with a range of up to 80 feet!

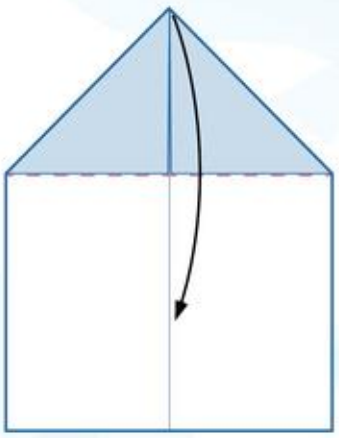
8.5 in x 11 in



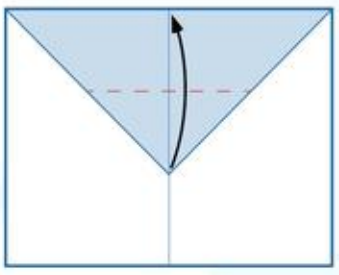
1. Fold the paper in half. Unfold.



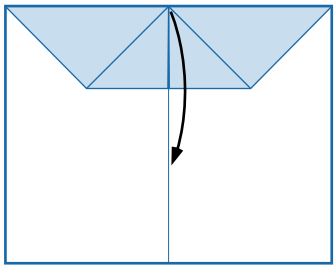
2. Fold the top corners in to the center to form a point.



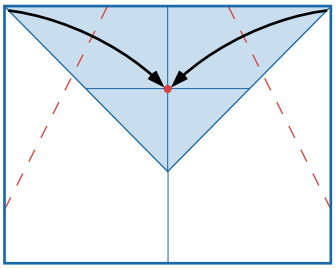
3. Fold the top triangle down on the dotted line.



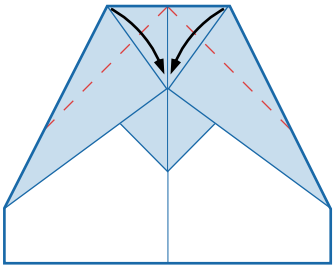
4. Fold the bottom point of the triangle to meet the top of the plane.



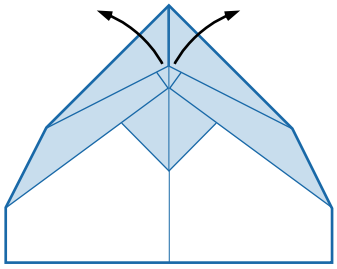
5. Unfold.



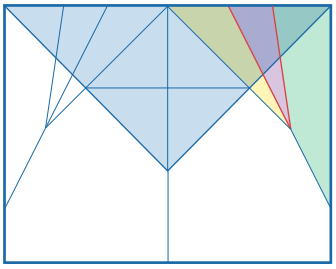
6. Fold the corners in to meet the intersection marked by the red dot.



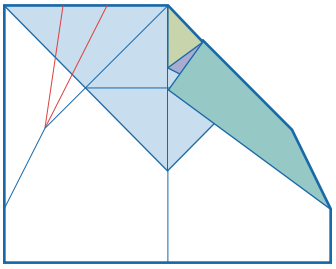
7. Fold the top corners in to the center crease to form a point at the top of the plane.



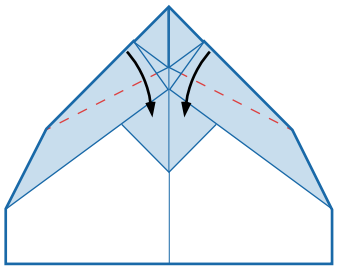
8. Unfold.



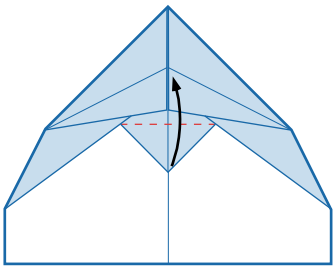
9. Reverse each of the creases highlighted in red, and collapse the layer to match the illustration in step 10. The yellow portion should be on the bottom, the back of purple in the middle, and the back of green on top.



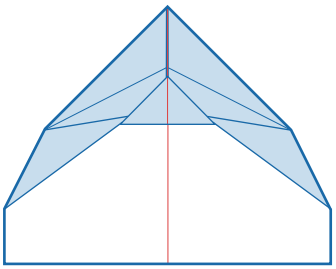
10. Repeat step 9 on the left side.



11. Fold the top flaps down at their natural limits. Use the existing crease on the underneath layer to create the same crease on the top layer.

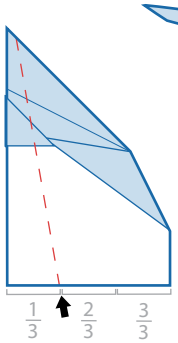


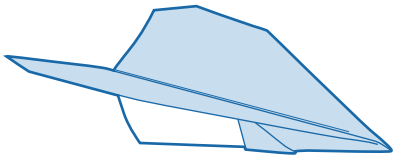
12. Fold the bottom point up, creasing on the dotted line.



13. Mountain fold the plane in half on the existing crease.

14. Fold the wings on the indicated line. Note that the crease starts just above the nose of the plane and ends about a third of the way down the bottom edge.





15. Finished!

Throwing Tip: Nakamura Jet is another plane that is pretty easy to throw. Give it a medium to hard throw somewhere between 0 and 45 degrees. If you find that it is diving or not gliding as nicely as you'd like, just bend the back edges of the wings up slightly!

Plasma X

Type: Dart **Difficulty:** Intermediate

Speed

Glide

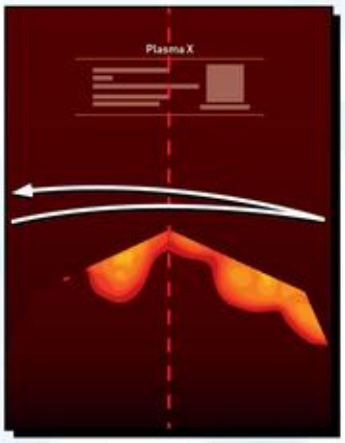
Accuracy

Click the QR Code to watch a video tutorial for this plane!

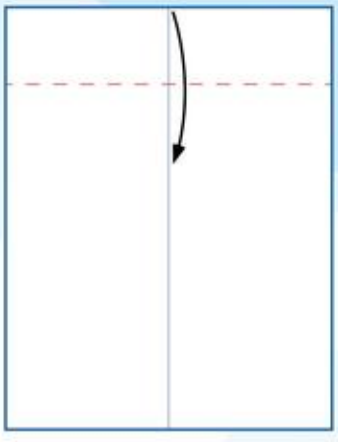
Or go to foldableflight.com/ipa-06-plasmax

If you're looking for extreme performance, Plasma X is the plane for you. No paper airplane in this book, and few in the world, can fly farther than this one. The strong leading edges of its wings allow Plasma X to withstand your hardest throws so that it flies with blistering speed. This, coupled with an excellent glide ratio, pushes Plasma X to distances well beyond 150 feet!

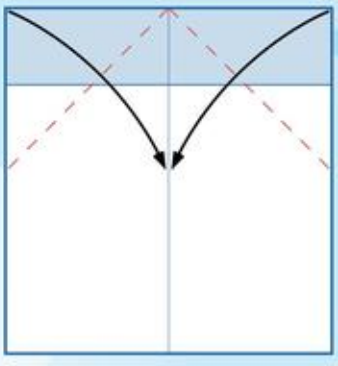
8.5 in x 11 in



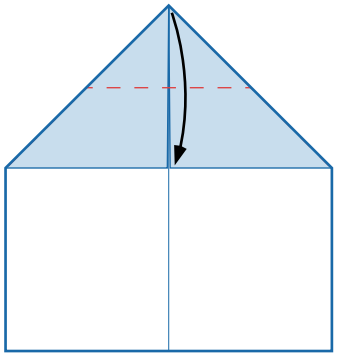
1. Fold the paper in half. Unfold.



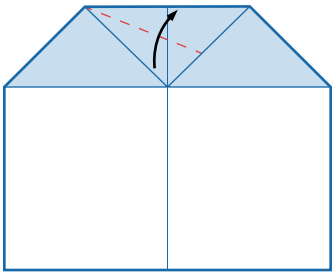
2. Fold the top two inches of the paper down as shown.



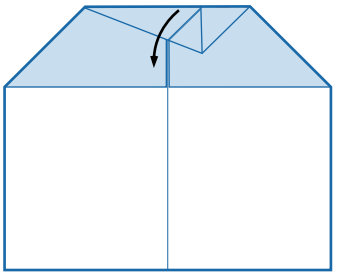
3. Fold the top corners in to the center to form a point.



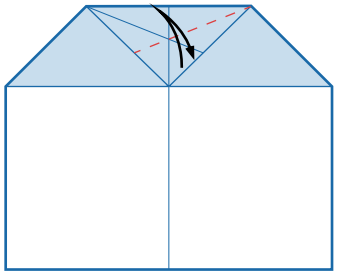
4. Fold the top point down as shown.



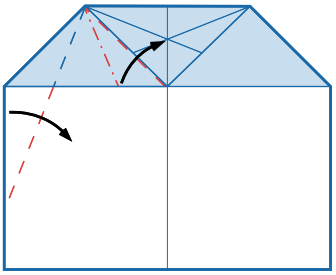
5. Fold the left edge of the triangle to land on the top edge of the paper.



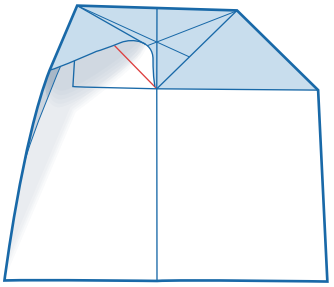
6. Unfold.



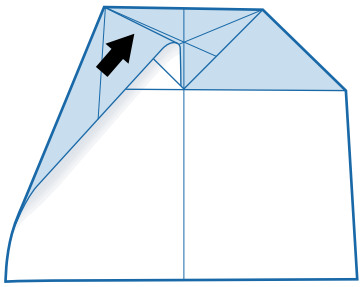
7. Repeat steps 5 and 6 on the right side.



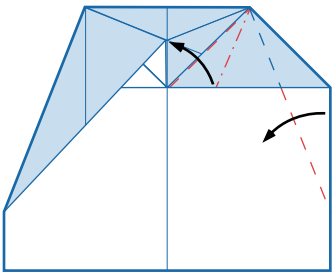
8a. Swivel fold so that the mountain crease lands on the crease made in step 5. Refer to steps 8b. and 8c. to see this fold in process.



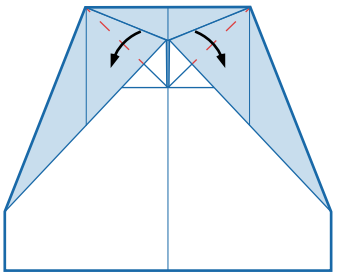
8b. Open the left pocket as shown and make a crease on the highlighted line by running your finger against the edge of the triangle that is the top layer of the plane.



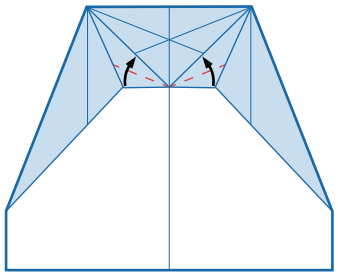
8c. Pull the layers diagonally to the right and flatten them to match the illustration shown in step 9.



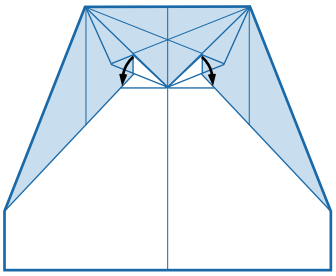
9. Repeat the swivel fold on the right side.



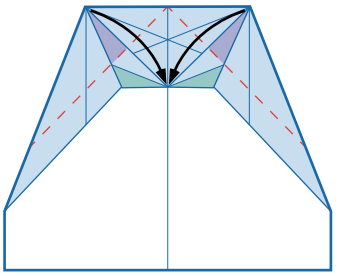
10. Fold the tabs created in the previous step down at their natural breaking point. (Along the edge of the top triangle.)



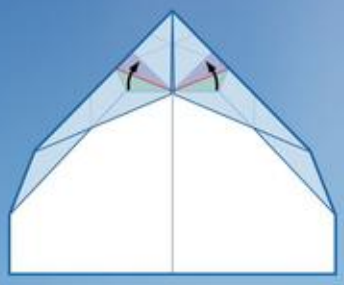
11. Fold the bottom edge of the tabs to land on the sides of the top triangle. Refer to the illustration in step 12 to see what this looks like.



12. Unfold.



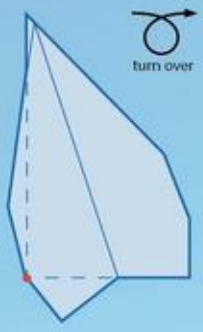
13. Fold the top edges to the center crease, creating a point at the top of the plane. Keep track of the tabs created in step 11 (highlighted in green) and the pockets that are being created as a consequence of this step (highlighted in purple).



14. Using the existing creases, tuck the flaps into the pockets. This is happening underneath the top layer and will lock the plane together. If you're struggling with this step, consider watching the video tutorial.

15. Mountain fold the plane in half on the existing crease.

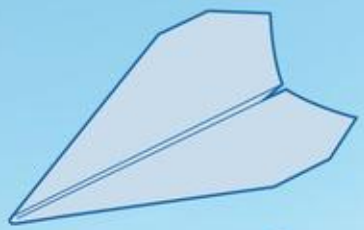
16. Begin the wing crease just to the side of the nose of the plane and fold so that the edge of the wing lands on the indicated corner to match the illustration in step 17.



17. Turn over.

18. Fold the other wing to match the first.

19. Open the wings.

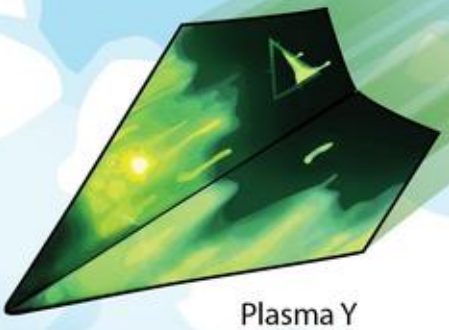


20. Finished!

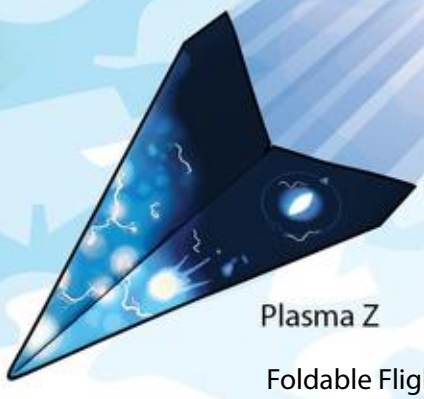
Throwing Tip: Warm up your arm and let loose! The harder you throw Plasma X, the farther it will fly! The best angle for release is somewhere between 20 and 40 degrees. Plasma X is a little nose heavy, so if it's diving, try bending the back edges of the wings up slightly.

Plasma X

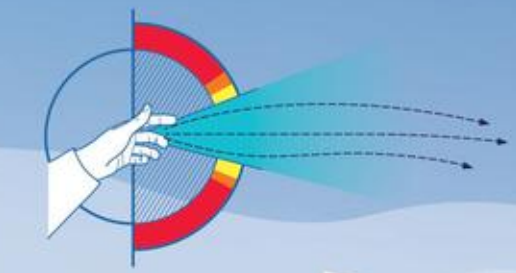
Learn how to fold Plasma Y and Plasma Z at FoldableFlight.com!

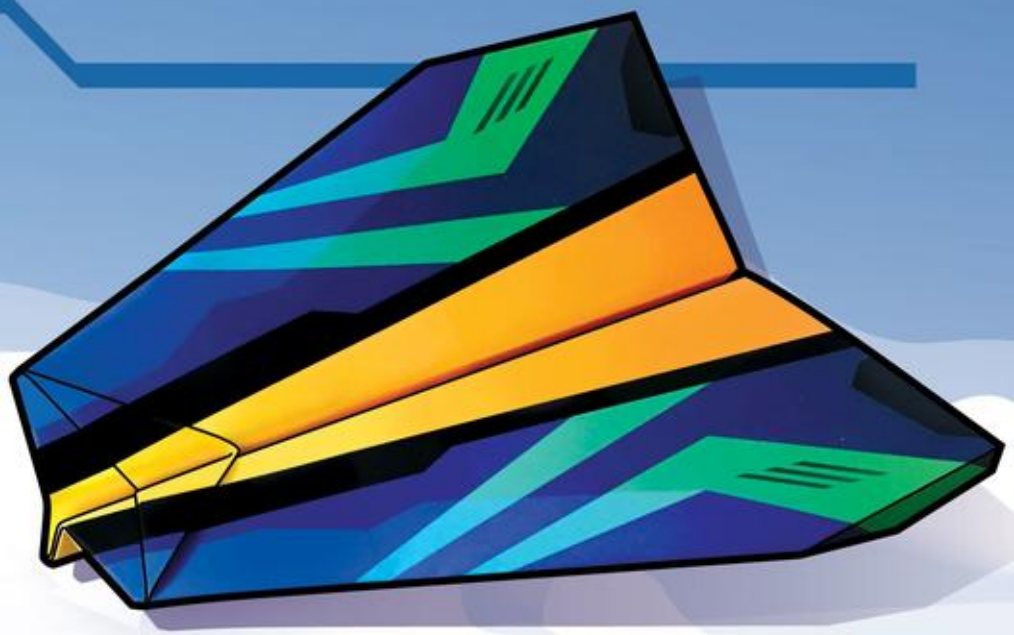


Plasma Y



Plasma Z





Voyager

Type: Glider **Difficulty:** Easy/Intermediate

Speed

Glide

Accuracy

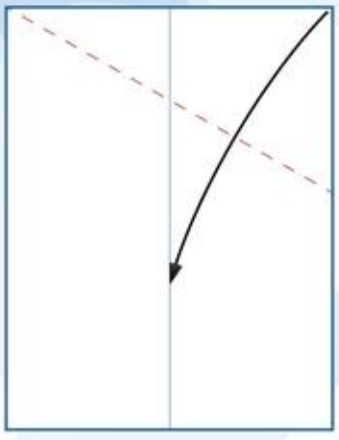
Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-07-voyager

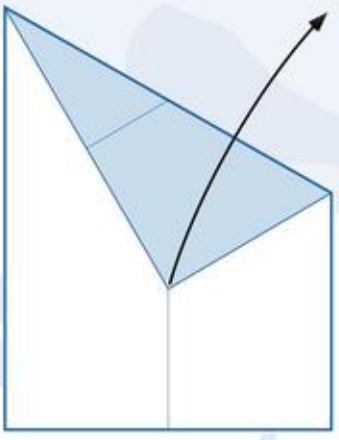
There are two different versions of Voyager. One is easy to fold, while the other is a bit more challenging. But, if you're willing to take on the more difficult version, you'll be pleased with the payoff at the end. Using some origami magic, the intermediate version locks into an aerodynamic and three-dimensional form that can't (easily) be unfolded. This fuselage lock offers advantages in flight and improves the performance of the plane.

8.5 in x 11 in

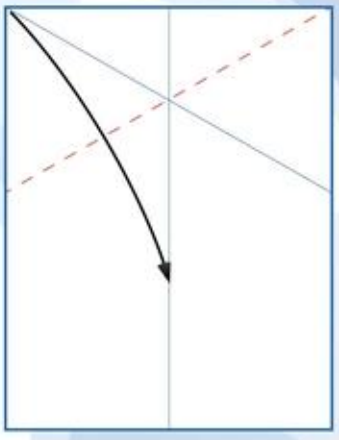
1. Fold the paper in half. Unfold.



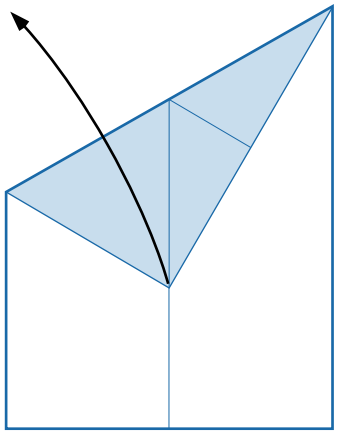
2. Fold the paper so the top right corner lands on the center crease and the new crease you are making goes through the top left corner.



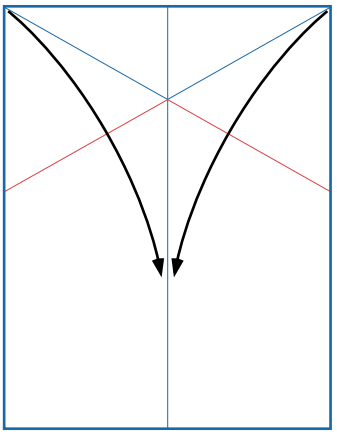
3. Unfold.



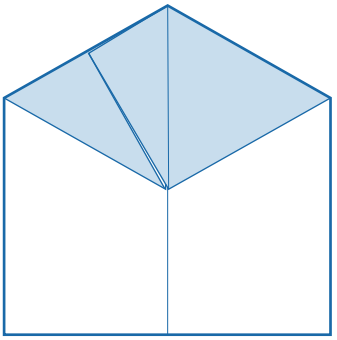
4. Fold the paper so the top left corner lands on the center crease and the new crease you are making goes through the top right corner.



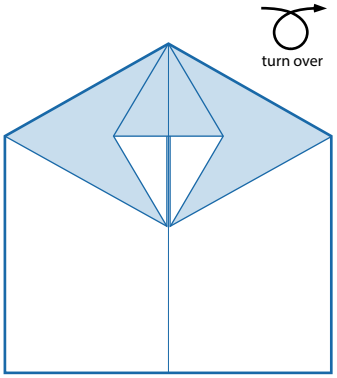
5. Unfold.



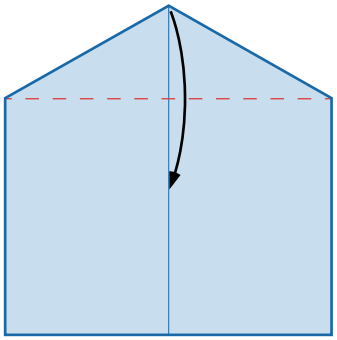
6. Using the highlighted portions of each crease, rabbit ear fold the paper to match the illustration in step 7. (To learn how to perform a rabbit ear fold, refer to the glossary of folds on page 9.)



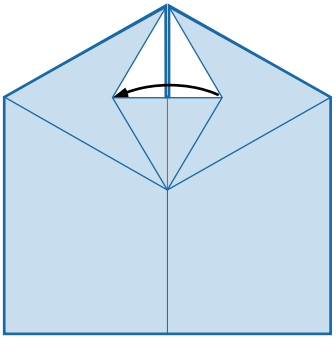
7. Stand the flap made in step 6 vertically and squash fold it to match the illustration in step 8.



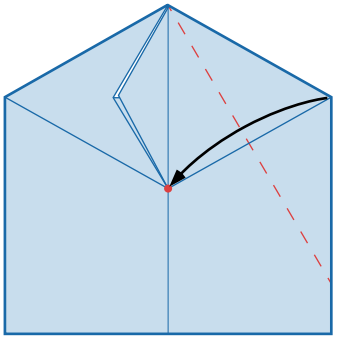
8. Turn the paper over.



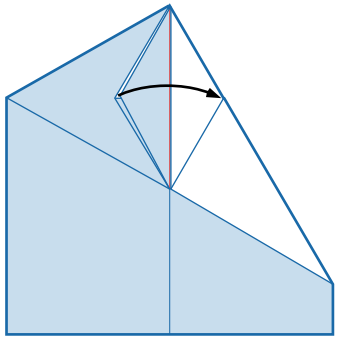
9. Fold the top point down, allowing the underneath layers to escape unfolded. Your crease should only affect a single layer.



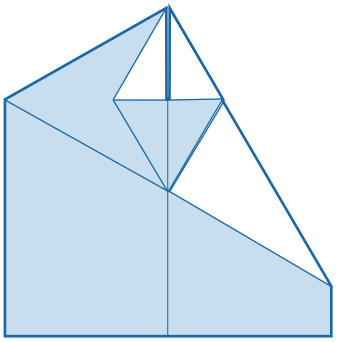
10. Flip the right flap to the left on its existing crease.



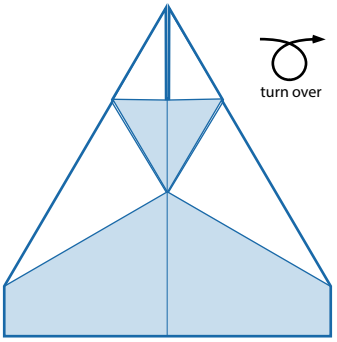
11. Fold the right corner to the indicated point, aligning the top right edge with the center crease.



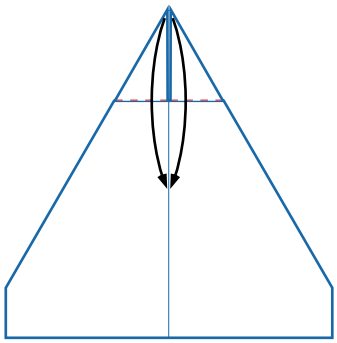
12. Flip the right flap back to the right on its existing crease.



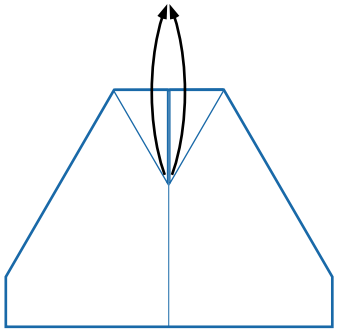
13. Repeat steps 10 through 12 on the left side.



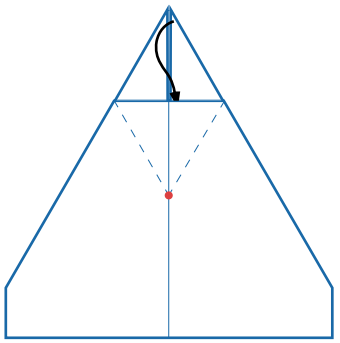
14. Turn the paper over.



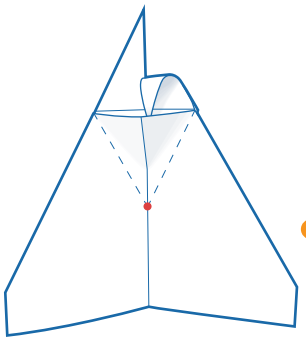
15. Fold the prongs down, creasing on the indicated line so the crease runs along the edge of the top layer.



16a. Unfold.



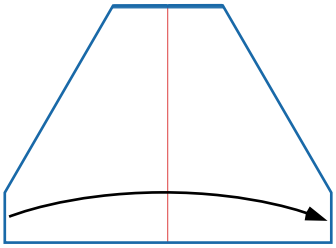
16b. One at a time, insert the prongs into the pocket, as shown in step 16c. The point of each prong should end up all the way inside the pocket, landing on the red dot.



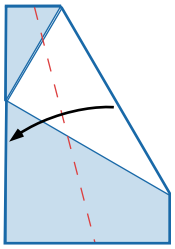
Easy

Intermediate

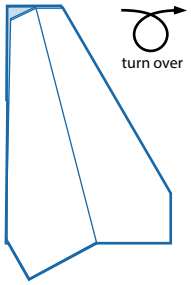
16c. Insert the prongs into the pocket, curling them, and then using the crease made in step 15 to lay them flat within the pocket.
After completing step 16c., decide whether you would like to fold the easy version of Voyager or the intermediate version.



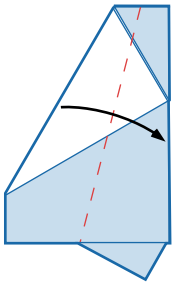
17. Fold the plane in half using the existing crease.



18. Fold the right edge of the plane to line up with the left edge.

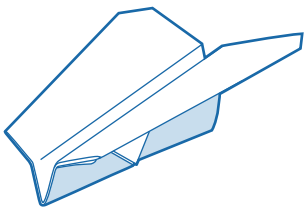


19. Turn the plane over.



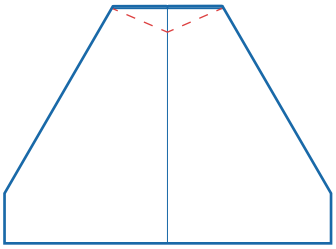
20. Fold the left edge of the plane to line up with the right edge.

21. Open the wings.

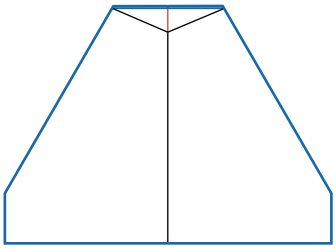


22. Finished!

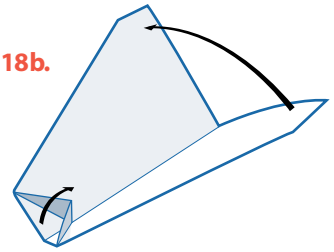
Throwing Tip: Voyager is a nice, gentle glider that can handle weak to medium-power throws. Give it a toss level to the ground, or at a slight angle upwards. With a harder throw, you can even angle it down and it should swoop up and fly level to the ground.

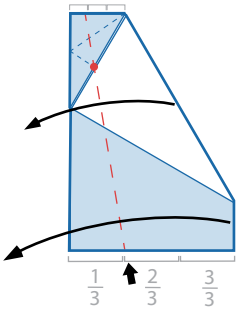


17. Pull the pocket open, and create creases along the indicated lines. The creases should converge at the center crease, about half an inch from the top of the plane.

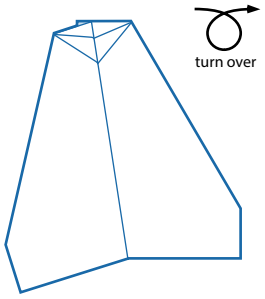


18a. Pull the pocket open along the creases made in the previous step. While you do this, fold the plane in half along the center crease. The creases highlighted in black should all be valley folds, and the crease in red should turn into a mountain as you open the pocket. Refer to illustration 18b. to see this in progress.

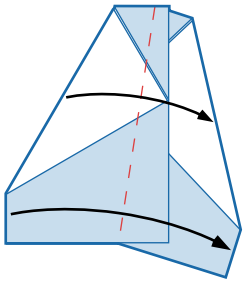




19. Fold the wing so that the crease goes through the joint of the pocket made in the previous step. The crease should begin about a third of the way up the front of the plane and end about a third of the way up the back of the plane.

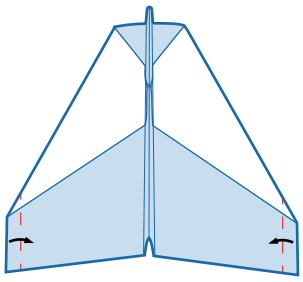


20. Turn the plane over.

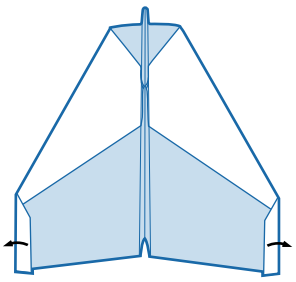


21. Fold the other wing to match. Be careful not to tear the joint of the pocket as you do this.

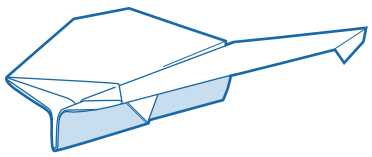
22. Open the wings and lay the plane upside down on the table.



23. Fold winglets so that the creases are parallel to the center crease of the plane.

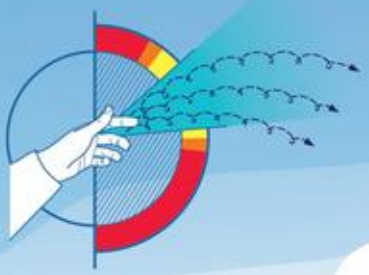


24. Open the winglets.



25. Finished!

Throwing Tip: This version of Voyager has wider wings than the easy version, meaning it will fair even better with gentle throws. That said, the fuselage lock on this plane also helps it to hold its shape when throwing with more power. You really can't go wrong with Voyager.



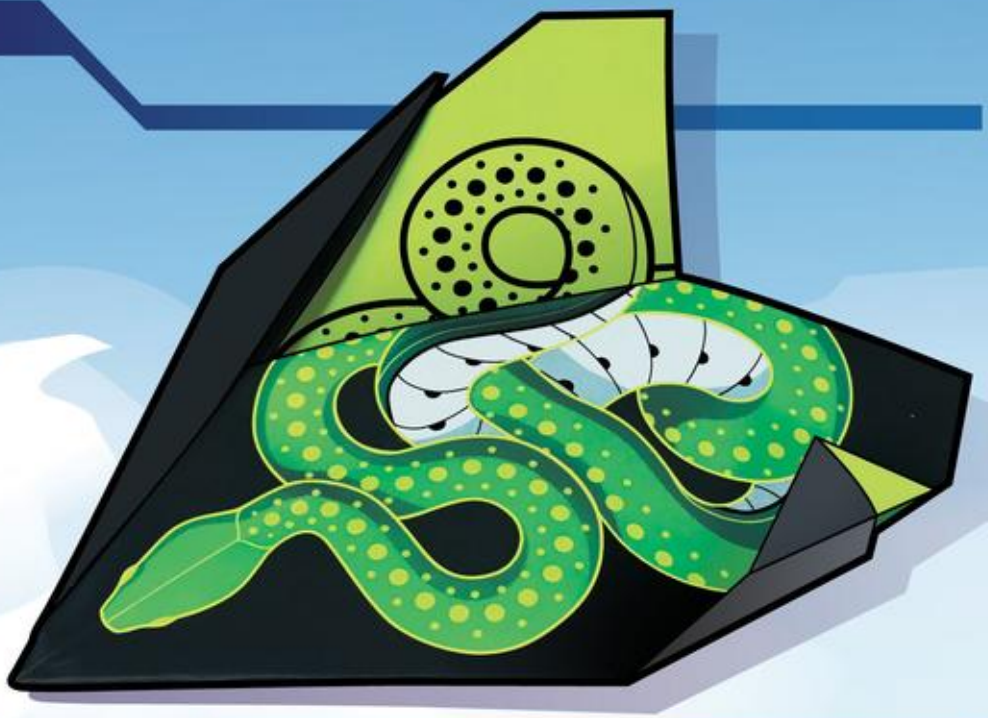
Helion

Type: Stunt **Difficulty:** Intermediate

Speed

Glide

Accuracy

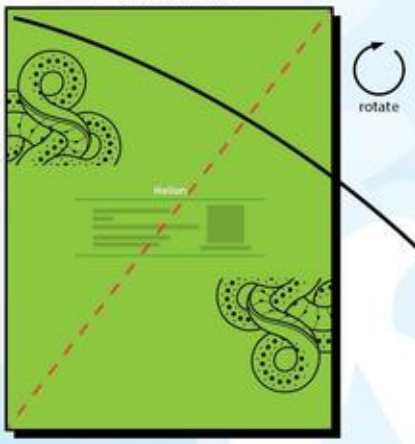


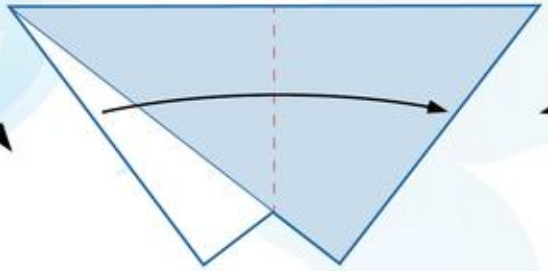
Click the QR Code to watch a video tutorial for this plane!

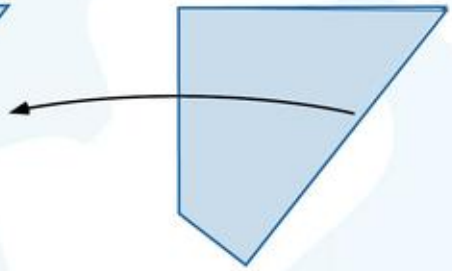
Or go to foldableflight.com/ipa-08-helion

Helion will defy all of your expectations about paper airplanes. While most planes have a left wing and a right wing that are symmetrical, Helion has a top wing and a bottom wing that bend in opposite directions. This causes the plane to spiral brilliantly as it flies! I have several "favorite" paper airplanes, and this definitely ranks among them. Hopefully, it will become one of your favorites as well.

8.5 in x 11 in



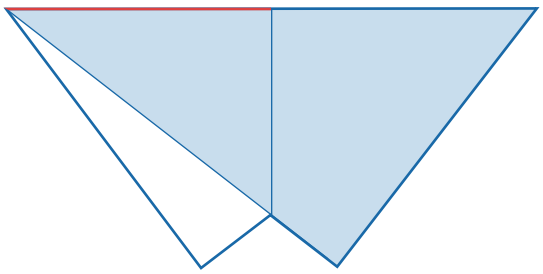




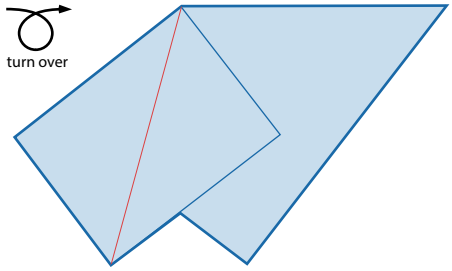
1. Fold the paper in half on the indicated diagonal and rotate it to match the illustration in step 2.

2. Fold the paper in half.

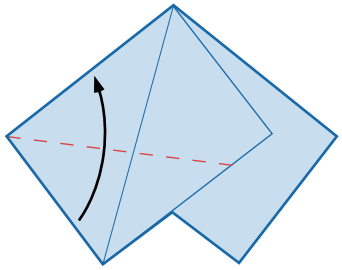
3. Unfold.



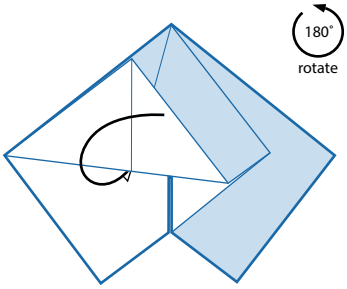
4. Stand the left half of the plane vertically and squash fold it to match the illustration in step 5. (To learn how to perform a squash fold, refer to the glossary of folds on page 7.) Note that as you do this, the top edge, highlighted in red, will become the highlighted diagonal crease in the next illustration.



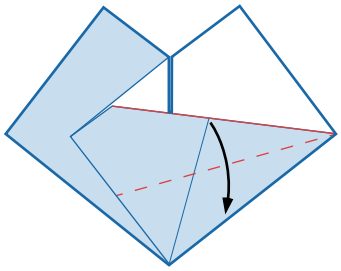
5. Turn the paper over and repeat step 4 on the other side.



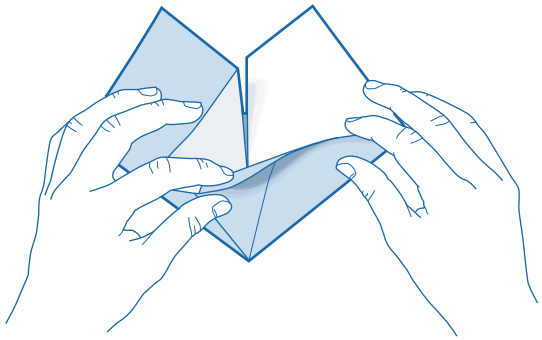
6. Fold the bottom left edge of the top layer to meet the top left edge of the plane.



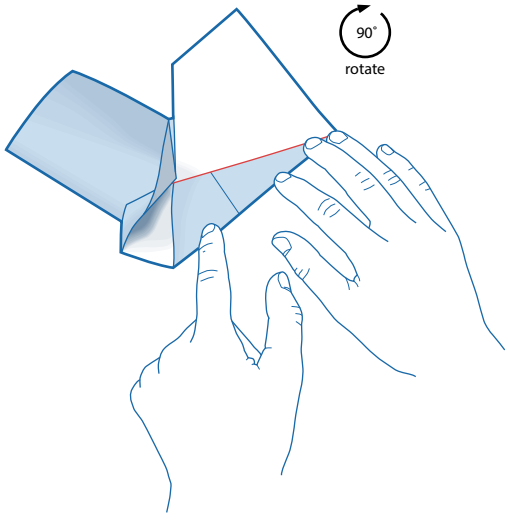
7. Reverse the crease made in the previous step and tuck the layer into the pocket. Rotate the plane 180 degrees.



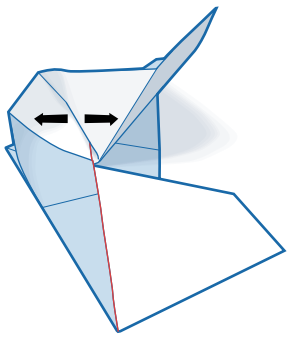
8a. Fold the highlighted edge to meet the right edge of the plane. Refer to steps 8b. through 8f. to learn how to perform this fold. Consider watching the video tutorial if you find this sequence to be difficult.



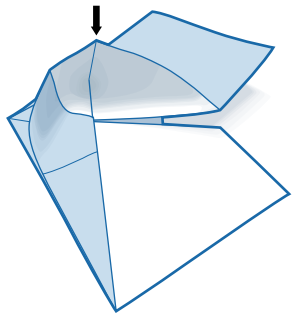
8b. Begin by grabbing the edge of the top layer as shown, pulling it toward the right edge of the plane. The left side of the plane will begin to pull forward as well, and that's fine.



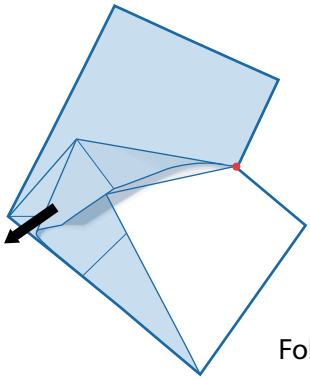
8c. Lay the edge of the top layer even with the edge of the plane and crease the highlighted section of the fold. Don't worry yet about creasing the section in the pocket that has now formed on the left. Rotate the plane 90 degrees clockwise.



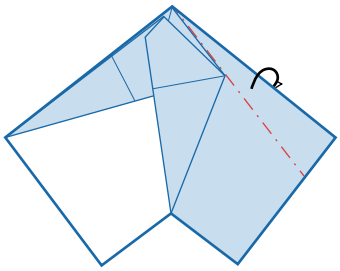
8d. You should now be looking into the pocket of the plane. Massage the pocket open to match the illustration in step 8e. and form the highlighted crease all the way into the corner of the pocket.



8e. Begin to flatten the pocket. Step 8f. shows this from above and provides more instruction.

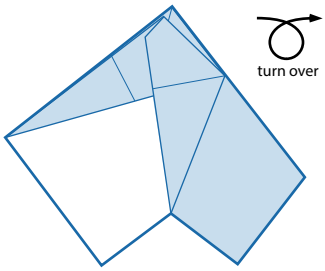


8f. Gently pull the pocket tight in the direction indicated by the arrow, so that the back of the pocket is pulled all the way to the point indicated by the red dot. Flatten the pocket to match the illustration in step 9.

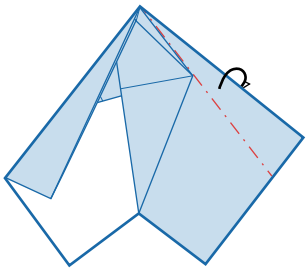


9. Repeat steps 6 through 8 on the other side and rotate the plane to match this illustration.

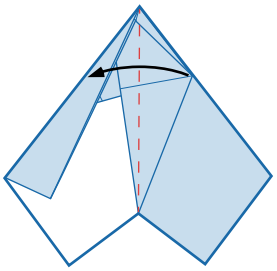
Next, mountain fold the wing on the indicated line. Your crease should run along the edge of the top layer as illustrated.



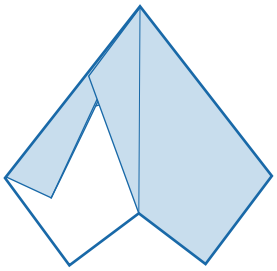
10. Turn the plane over.



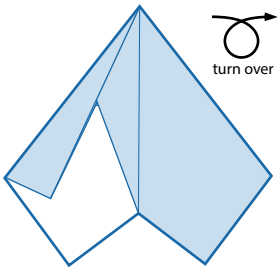
11. Mountain fold the wing on the indicated line. Your crease should run along the edge of the top layer, as illustrated.



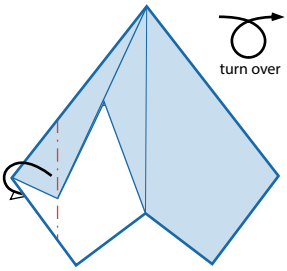
12. Fold the top flap on the indicated line so that the top edge of the flap lines up with the left edge of the plane.



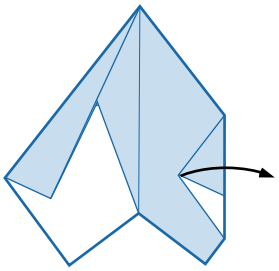
13. Tuck the top flap into the pocket formed by the layers beneath it to match the illustration in step 14.



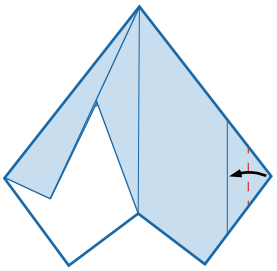
14. Turn the paper over and repeat steps 12 and 13 on the other side.



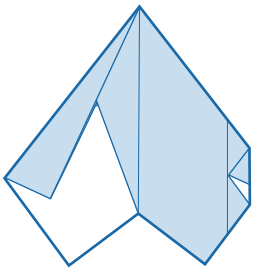
15. Mountain fold the wing on the indicated line, parallel to the center crease, so that the new crease goes through the corner of the top layer. The paper should want to naturally fold along this line. Turn the paper over.



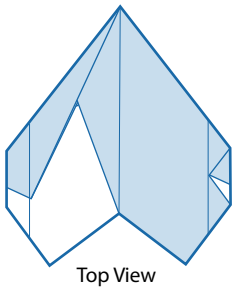
16. Unfold.

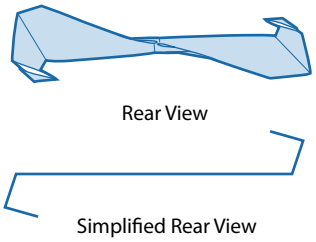


17. Fold the corner of the plane in so that the point meets the crease made in step 15. Make sure your crease runs parallel to that step 15 crease.

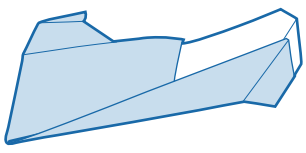


18. Repeat steps 15 through 17 on the left side.



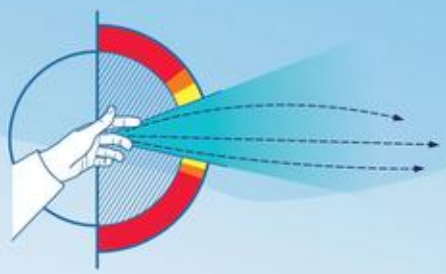


19. Set the winglets to match the illustrations above.



20. Finished!

Throwing Tip: Helion is a tricky plane to throw. You might be thinking, "Where do I hold it?" The answer is easy, but maybe a little unexpected. Just hold the thick edge of one of its wings! I place my thumb on one side of the plane and my middle and forefingers on the other. Grab the wing near it's rear fin, aim higher than you think is necessary, and throw it as hard as you can!



Bayonet

Type: Glider **Difficulty:** Intermediate

Speed

Glide

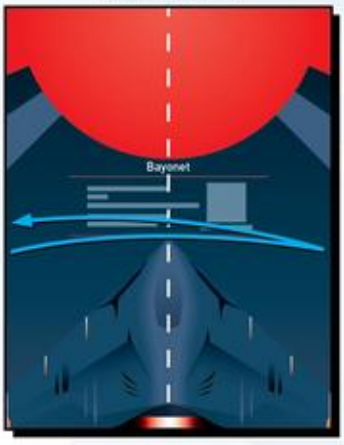
Accuracy

Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-09-bayonet

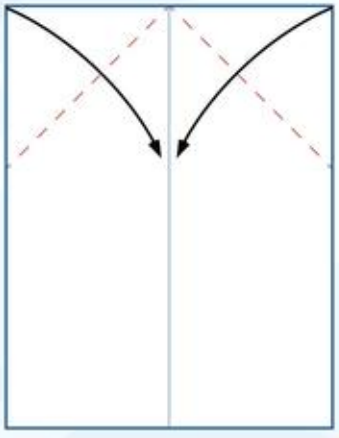
Bayonet is an extremely unique paper airplane. From its wing shape, to its fuselage, to the pointed blade at the nose of the plane, nothing about Bayonet is conventional. The folding sequence is unusual as well, and may present you with a bit of a challenge, but the end result is a beautiful and terrifying paper airplane that flies quite well. But don't throw it at your friends. Eyes are precious, and this plane represents a serious threat to the vision of anyone hit by it.

8.5 in x 11 in

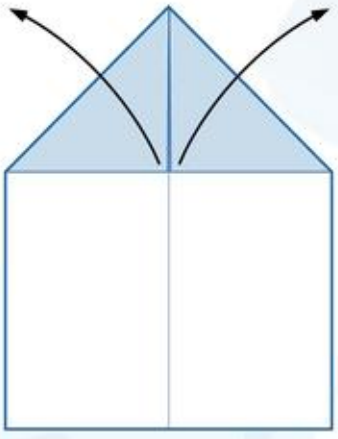


1. Fold the paper in half. Unfold and turn the paper over.

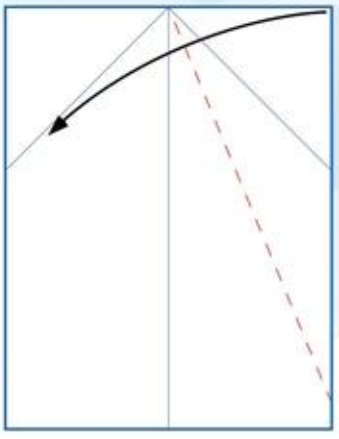
turn over



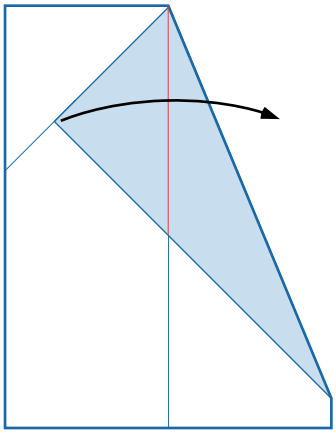
2. Fold the top corners in to the center.



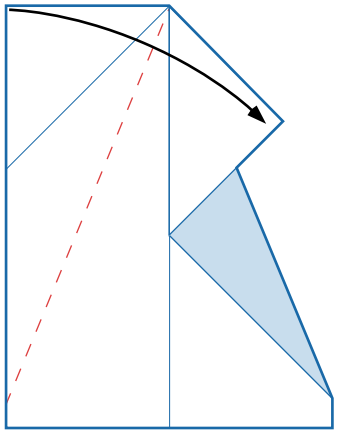
3. Unfold.



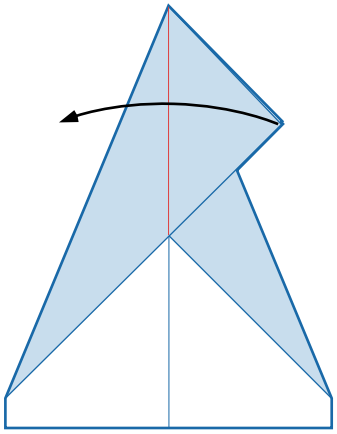
4. Fold the top right corner on the indicated line. The top edge of the paper should land on the left diagonal crease and the right diagonal crease should land on the center crease.



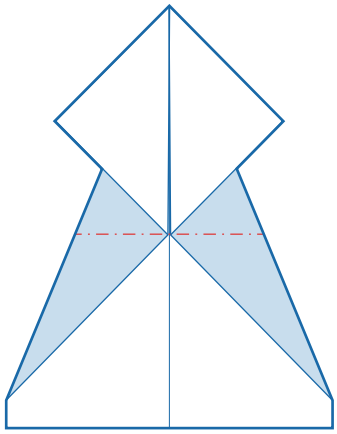
5. Fold the flap back over the center crease.



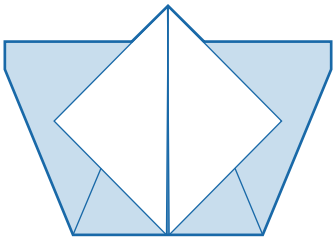
6. Fold the left corner so it lands on and lines up with the right flap.



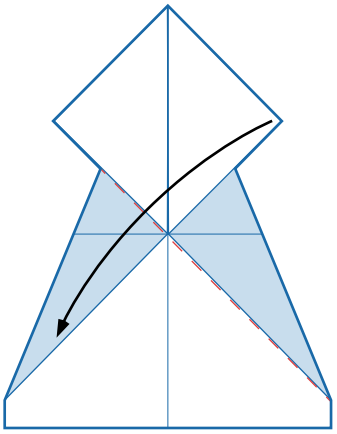
7. Reverse the existing crease on the top layer.



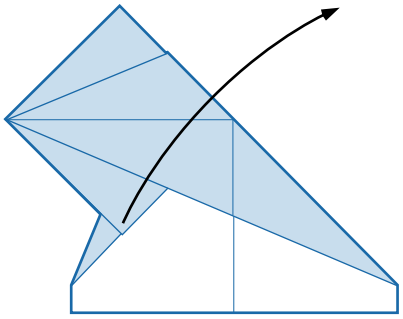
8. Mountain fold the paper on the indicated crease.



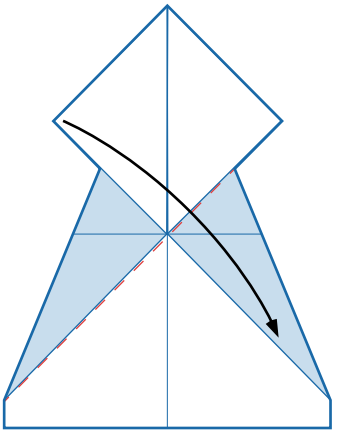
9. Unfold.



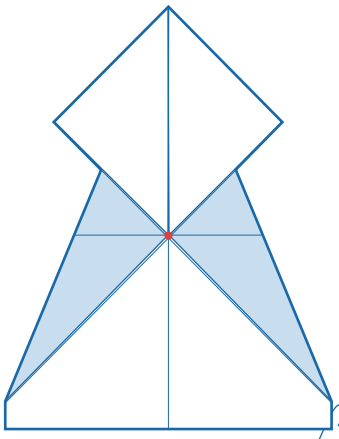
10. Fold along the right diagonal edge formed by the layers. The new crease should go through the intersection of the center crease and the horizontal crease.



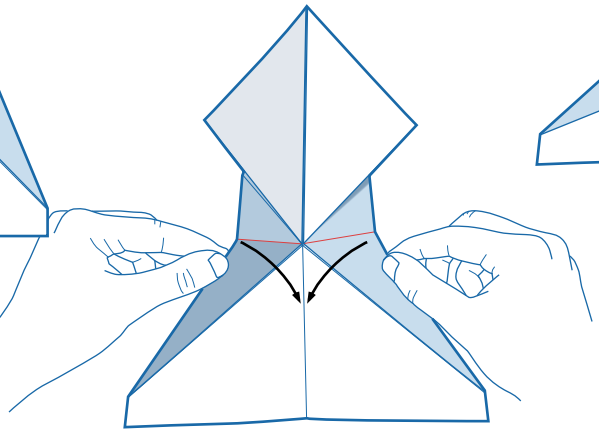
11. Unfold.



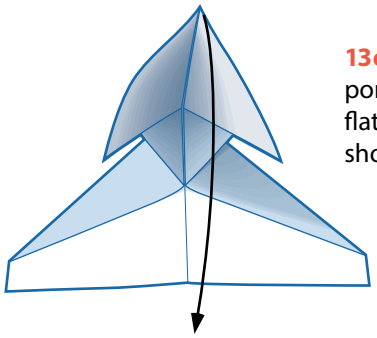
12. Repeat steps 10 and 11 on the left side.



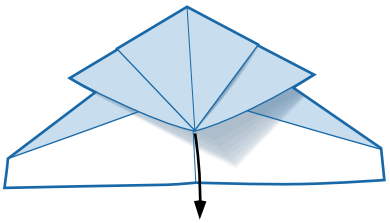
13a. Poke the highlighted red dot, and then grab the paper on either side, just below the horizontal crease.



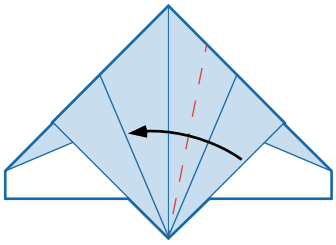
13b. Pull the edges of the paper in so that the highlighted creases land on the center crease. This should leave a portion of the paper standing upright.



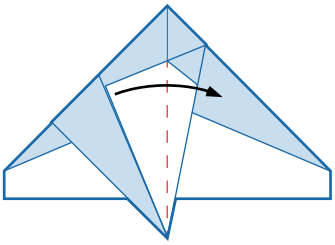
13c. Begin to pull the upright portion of the paper down to flatten the plane. Step 13d. shows this in progress.



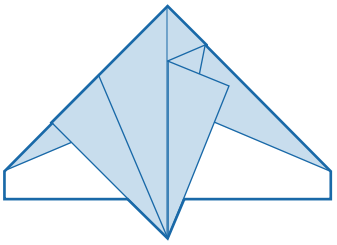
13d. Flatten the paper to match the illustration in step 14.



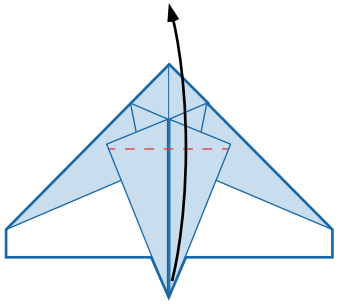
14. Fold the right flap so that it meets the left diagonal edge of the top layer.



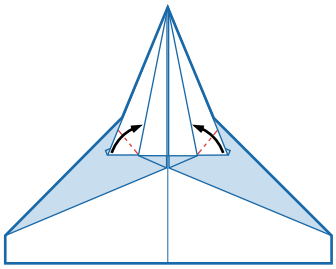
15. Fold the flap back over the center crease as shown.



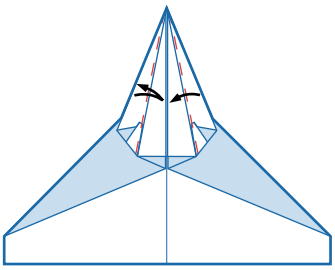
16. Repeat steps 14 and 15 on the left side.



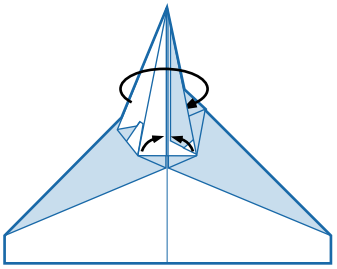
17. Fold the bottom point forward at its natural limits, indicated by the red dotted line.



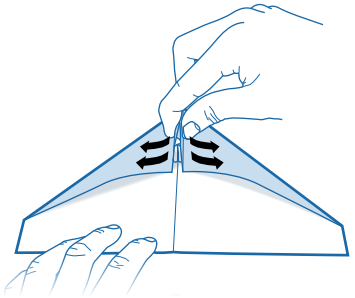
18. Fold the bottom corners of the outer flaps in to the edge of the top layer.



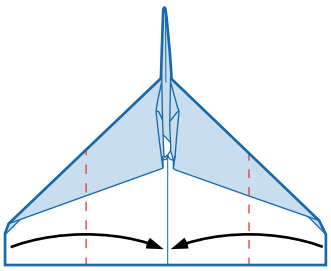
19. Fold the outer flaps in along the edge of the top layer, then unfold the left flap.



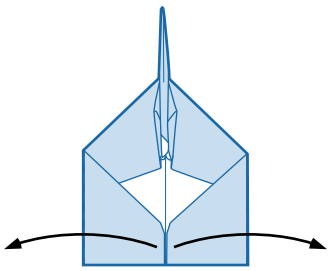
20. Pull the two halves of the front portion of the plane together to stand vertically, and tuck the left flap tightly behind the layer that the right flap is on. This should form a central fuselage that is locked together. This step is tough to illustrate, so consider watching the video tutorial here.



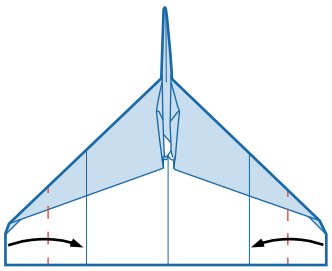
21. Press the middle section that was formed in step 20 down into the plane. The outer layers should lift off the paper. While holding the middle section down, flatten those layers outwards.



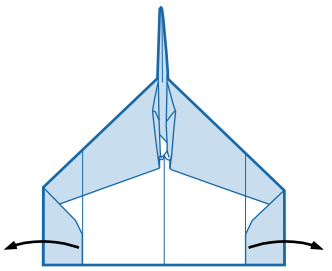
22. Fold the outer edges in to the center crease.



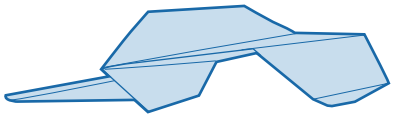
23. Unfold.



24. Fold the edges in to meet the creases made in step 22.



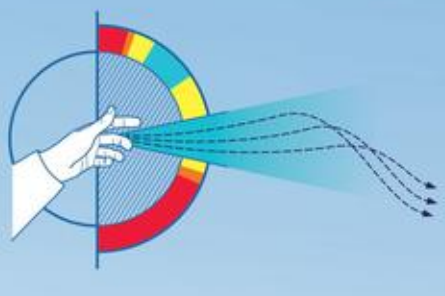
25. Unfold and set the angles of the wings to match the rear view.

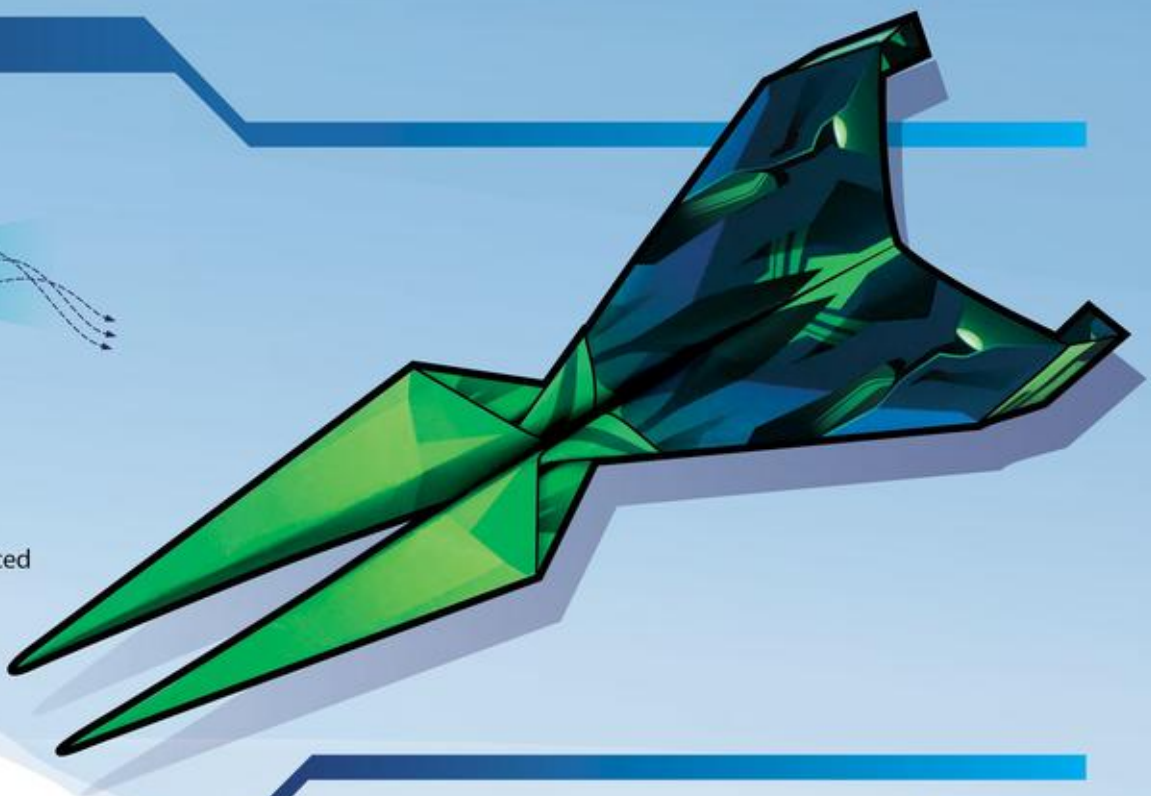


26. Finished!

Simplified Rear View

Throwing Tip: Bayonet looks like a fast flier with its aggressive stance and jutting prong, but it actually flies best with a medium-strength throw.





Spectre

Type: Dart **Difficulty:** Advanced

Speed

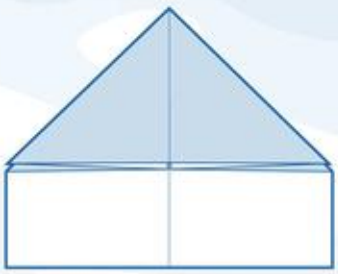
Glide

Accuracy

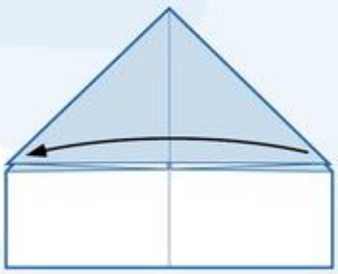
Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-10-spectre

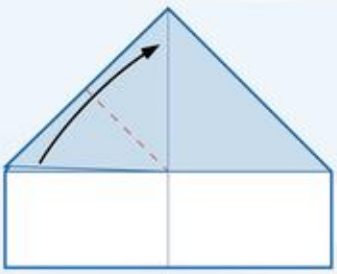
Spectre was my first attempt at creating a spiked paper airplane, and it might just be my best. Few paper airplanes are as visually striking as Spectre. With its terrifying prongs and its pinched waist, it truly looks like some kind of alien spacecraft. And, while it can be difficult to fold and difficult to properly adjust, you might be surprised to find that it is capable of flying quite well too! With its small wing area and elongated body, Spectre can fly exceptionally quickly, so get ready to launch it with all your might! If you find that you're having trouble getting Spectre to fly properly, be sure to read the tips and tricks on pages 14 and 15.



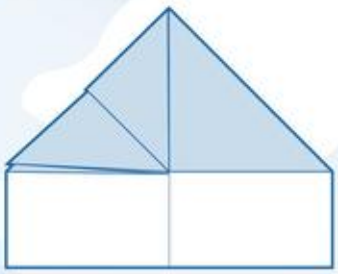
1. Begin with the waterbomb base. (To learn how to fold the waterbomb base, refer to the glossary of folds on page 6.)



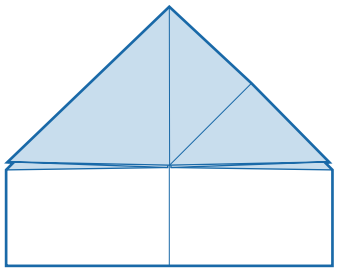
2. Flip the right triangular flap to the left.



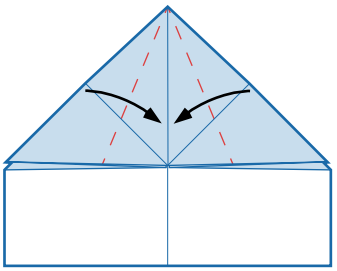
3. Fold the left corner of the top flap up to meet the top point of the plane.



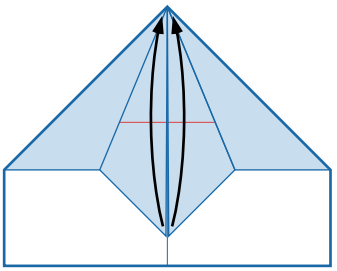
4. Unfold the fold made in step 3 and flip the triangular flap back to its original side.



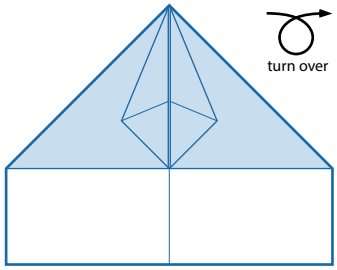
5. Repeat steps 2 through 4 for the left flap.



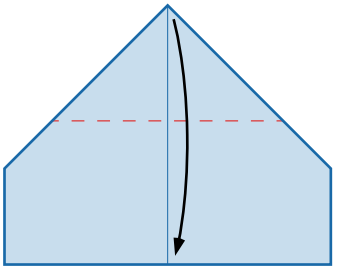
6. Fold the edges of the flaps in to meet the center crease.



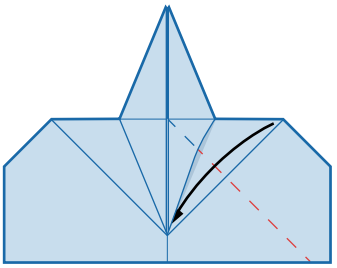
7. Petal fold each flap on the highlighted crease so that the bottom points of the flaps meet the top point of the plane. (To learn how to perform a petal fold, refer to the glossary of folds on page 8.)



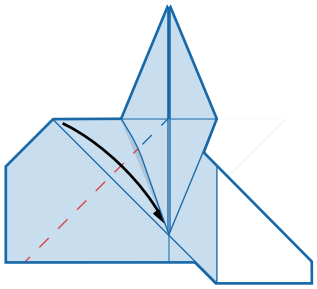
8. Turn the paper over.



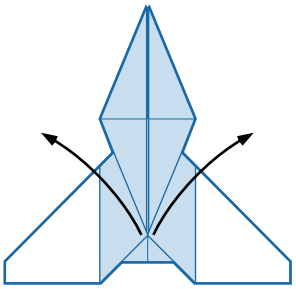
9. Fold the top point down at its natural folding point. Refer to the illustration in step 10 to see what it should look like after the fold.



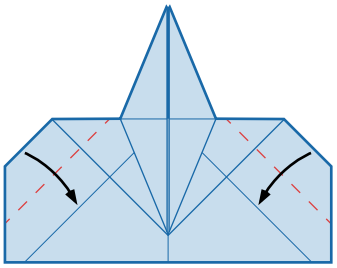
10. Open the right pocket formed by the top layer and fold the right edge in to the center. Don't fold the top layer — fold the other layers into the pocket.



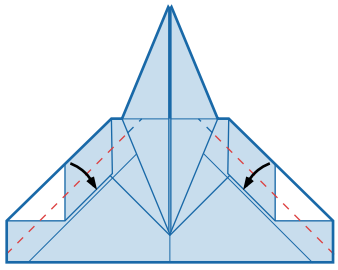
11. Repeat step 10 on the left side.



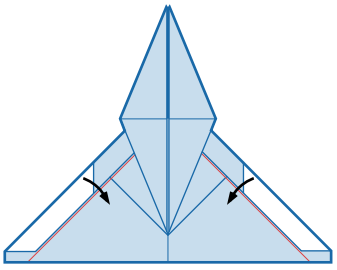
12. Unfold.



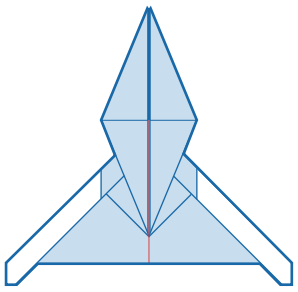
13. Fold the edges in to almost meet the diagonal creases made in step 12. Leave a slight gap to match the illustration in step 14.



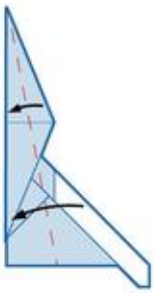
14. Fold the edges in again to almost meet the diagonal creases in steps 10 and 11. Leave a slight gap to match the illustration in step 15.



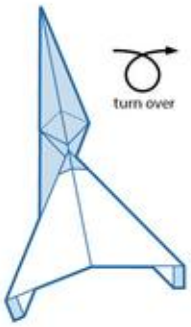
15. Fold in on the creases made in steps 10 and 11.



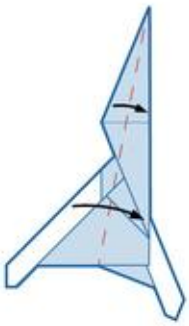
16. Mountain fold the plane in half along the existing center crease. It may bulge in weird ways, but don't worry, this will improve when we fold the wings.



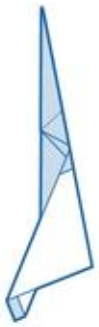
17. Fold the top portion of the wing to meet the edge of the fuselage. Follow the same angle to crease the back half of the wing.



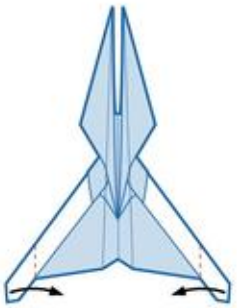
18. Turn the plane over.



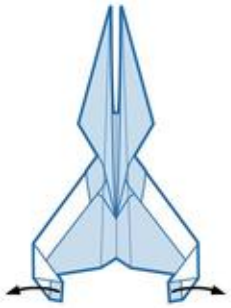
19. Fold the other wing to match.



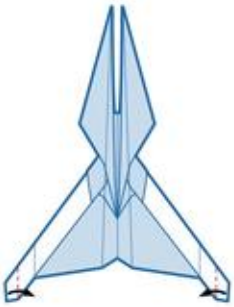
20. Open the wings and set the plane on the table.



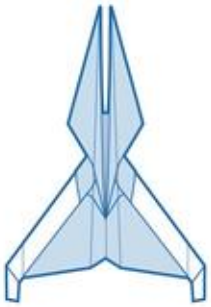
21. Fold the winglets on the indicated lines, parallel to the center crease.



22. Unfold.

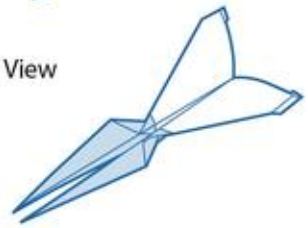


23. Fold the winglets in again on the indicated lines, parallel to the center crease.



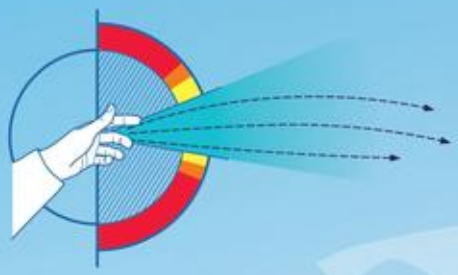
24. Set the winglets and the wings to the angles shown in the rear view.

Simplified Rear View



25. Finished!

Throwing Tip: Spectre is an extremely aggressive plane. Throw it as fast as you can, and it will fly wildly around the room! Spectre can fly excellently, but it will test your ability to properly adjust a paper airplane. Be sure to study up on pages 14 and 15.



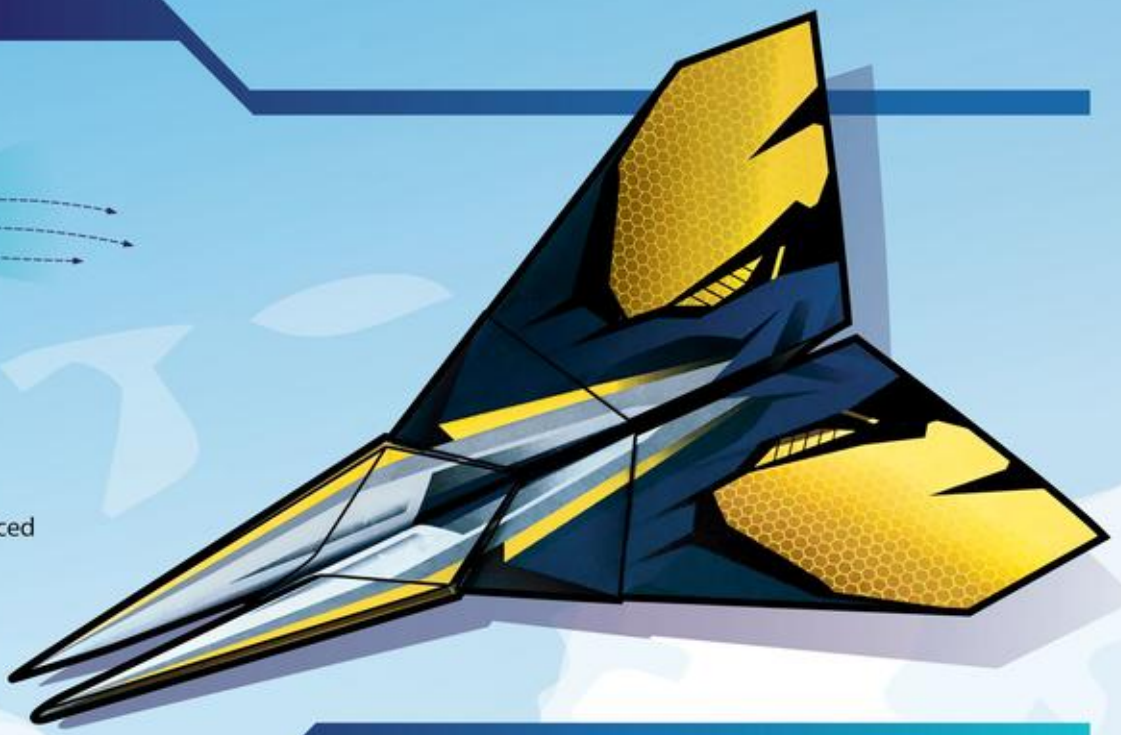
Sentry

Type: Dart **Difficulty:** Advanced

Speed

Glide

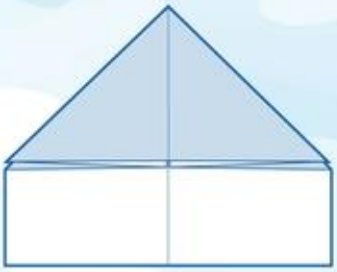
Accuracy



Click the QR Code to watch a video tutorial for this plane!

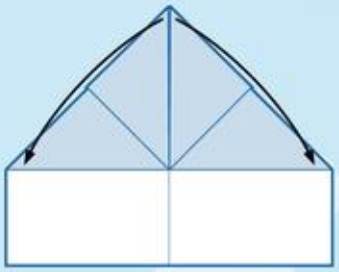
Or go to foldableflight.com/ipa-11-sentry

After designing Spectre, I was inspired to create another pronged paper airplane. Using a similar folding sequence to that of Spectre, I created Sentry to share its dramatic and intimidating appearance. But, while Spectre is an erratic aircraft, focused on blistering speed at the expense of accuracy and glide, Sentry flies in a stable and controlled manner. Sentry is bit harder to fold than Spectre, but you may find that the added difficulty is paid for in higher performance from this aircraft. With careful consideration and precise folding, you'll have an excellent paper airplane on your hands!

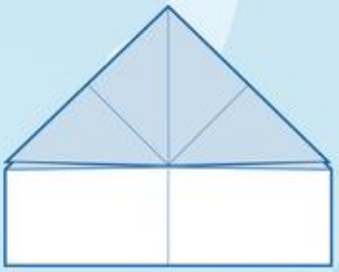


1. Begin with the waterbomb base. (To learn how to fold the waterbomb base, refer to the glossary of folds on page 6.)

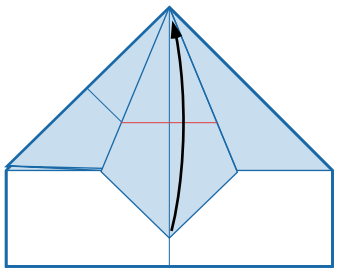
2. Fold the outer corners of the top layers to meet the top point of the plane.



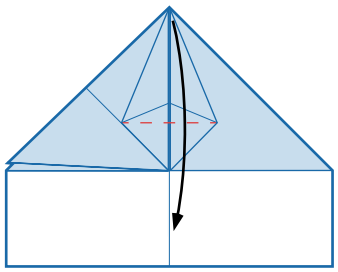
3. Unfold.



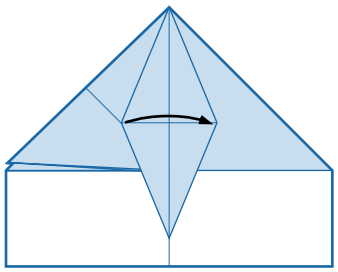
4. Squash fold the right flap to match the illustration in step 5. (Refer to the glossary of folds on page 7.)



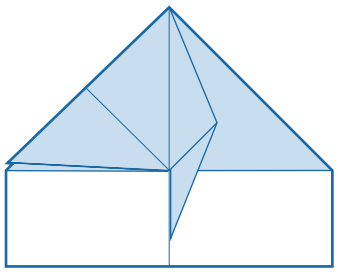
5. Using the highlighted crease, petal fold the bottom point so that it lands on the top point. (To learn how to perform a petal fold, refer to the glossary of folds on page 8.)



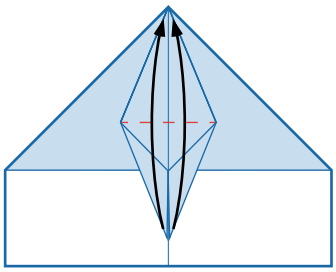
6. Fold the top layer down on the indicated line.



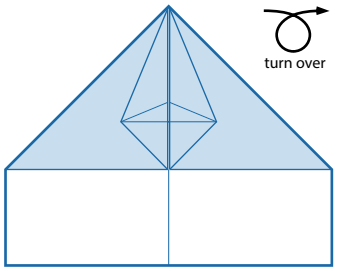
7. Fold the left half of the top layer to the right.



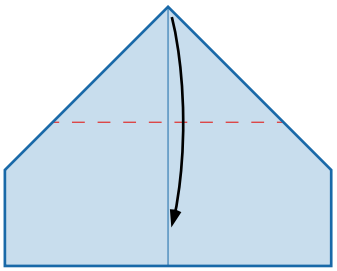
8. Repeat steps 4 through 7 on the left side.



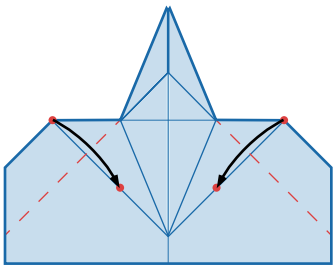
9. Fold each of the bottom points to the top point.



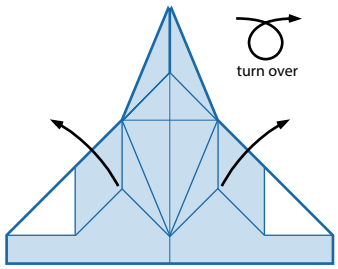
10. Turn the paper over.



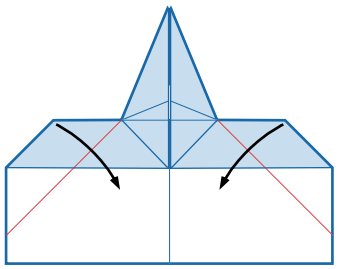
11. Fold the top point of the top layer down at the dotted line. Look at the next illustration and notice that the crease you make in this step intersects the side corners of the top diamond.



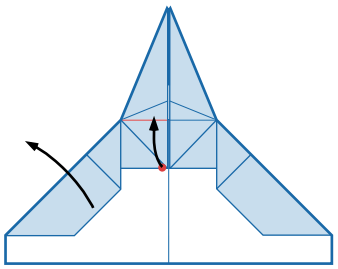
12. Fold the upper corners of the outer flaps in to the edge of the top layer. The creases should be 45 degree angles that start at the side points of the top diamond.



13. Unfold and turn the paper over.

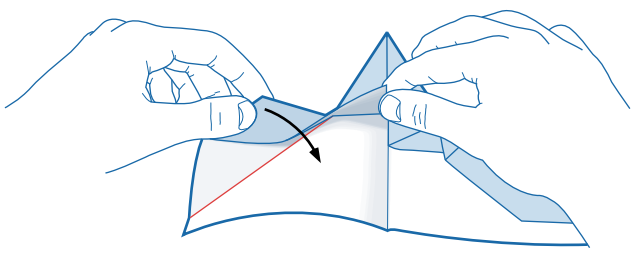


14. Fold the edges in on the creases made in step 12.

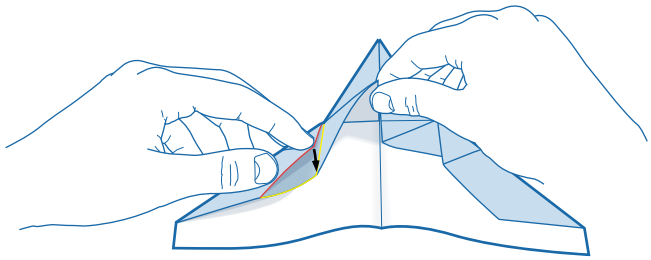


15a. Open the left flap and lift the layer beneath it by the point marked with the red dot so that it stands vertically. Use the highlighted horizontal crease as a hinge.

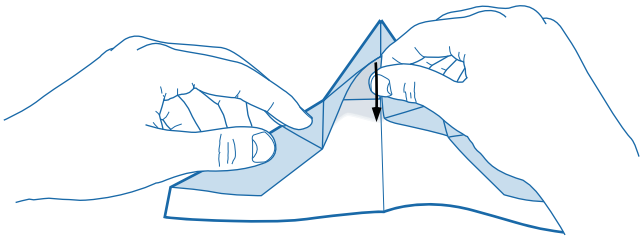
Step 15 is tricky. If you're struggling, be sure to watch the video tutorial for help.



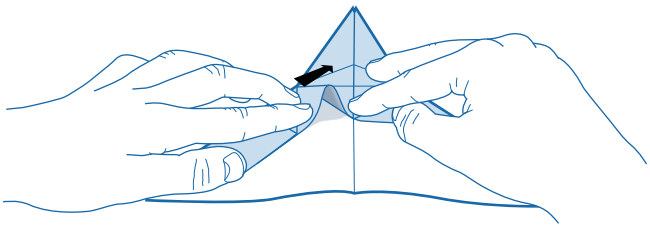
15b. With your right hand, hold the layer vertical. Begin to close the left flap, using the existing crease, highlighted in red, as your hinge.



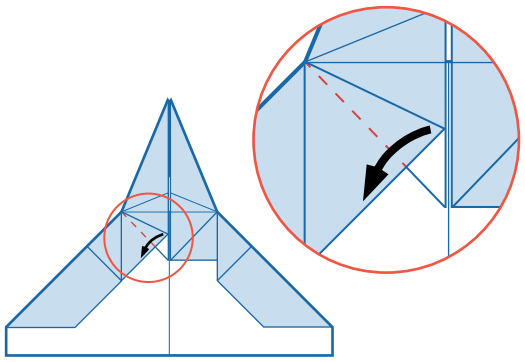
15c. Flatten the left flap, creating a new crease. The red edges of the top layer should line up with the yellow edge and yellow crease of the bottom layer.



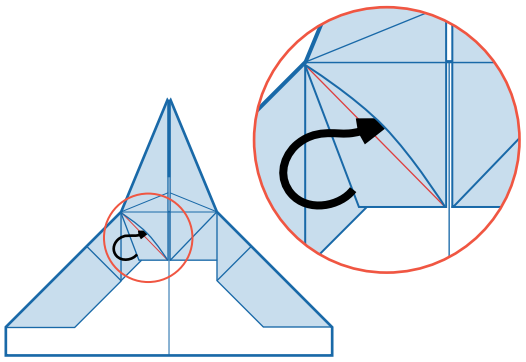
15d. While holding the left flap down, pull the layer in your right hand back down. This will create a bulge of unfolded paper.



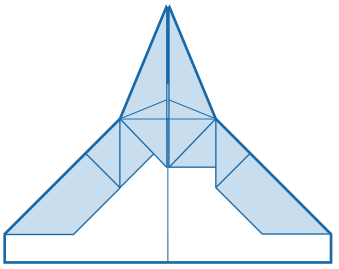
15e. Flatten the bulge diagonally to the right to match the illustration in step 16.



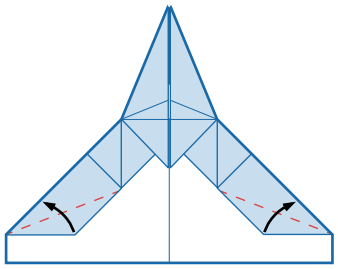
16. Fold the flap formed from the previous step back on the 45 degree angle as shown.



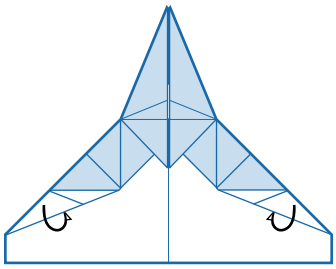
17. Tuck the flap into the pocket using the existing crease.



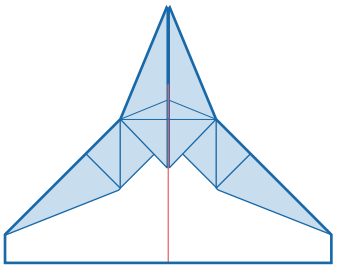
18. Repeat steps 15 through 17 on the right side.



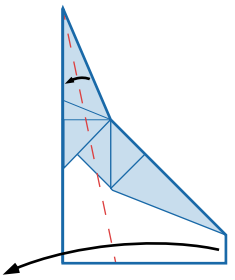
19. Fold the bottom edges of the top layers to meet the outside edges of the plane.



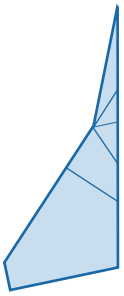
20. Reverse the folds made in step 19 and tuck the flaps underneath the other layers.



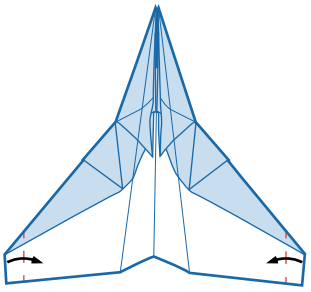
21. Mountain fold the plane in half on the existing crease.



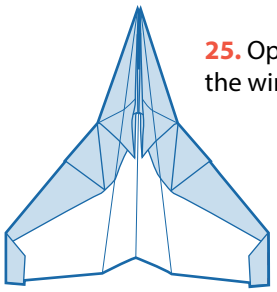
22. Fold the wings so that the right edge of the nose meets the left edge. Follow the same line for the back of the wing.



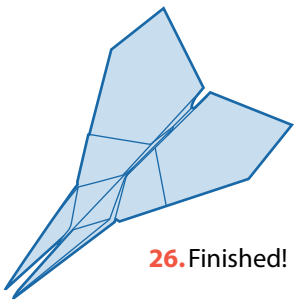
23. Open the wings and set the plane on the table.



24. Fold small winglets parallel to the center of the plane.

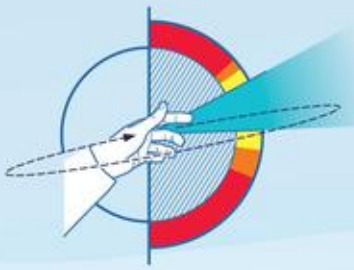


25. Open the winglets.



26. Finished!

Throwing Tip: Sentry looks aggressive with its sharp, two-pronged nose, but it flies in a controlled manner. It will fair best with a throw of medium power.



Zoomerang

Type: Stunt **Difficulty:** Advanced

Speed

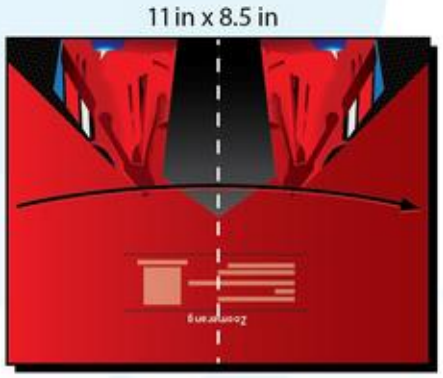
Glide

Accuracy

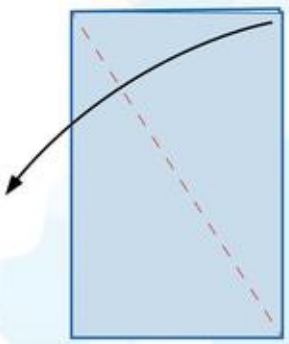
Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-12-zoomerang

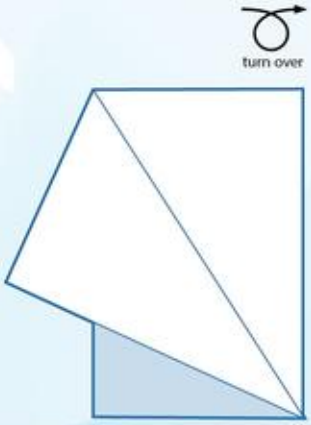
Zoomerang is a paper airplane like you've never seen before. Just like a boomerang, it flies in a circle back to you! You can throw it to the left, or you can throw it to the right. In either case, it'll end up right where its journey began. Make sure you turn the plane sideways to throw it. You'll also want to give the wings anhedral angle (learn more on page 15). This will encourage the plane to remain in a banked attitude, helping it to complete its circle without exiting the turn. If you have trouble getting the plane to fly in a circle, watching the video tutorial should help!



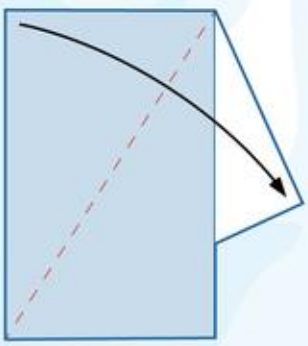
1. Fold the paper in half.



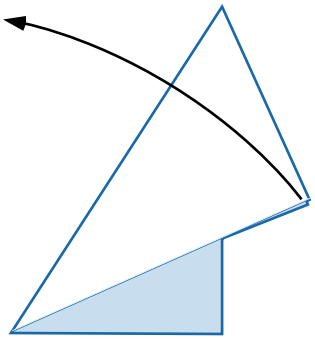
2. Fold the top right corner diagonally, creasing from the top left corner to the bottom right corner.



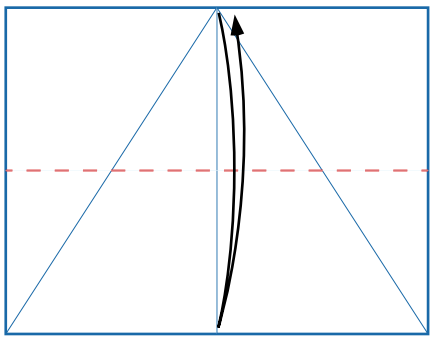
3. Turn the paper over.



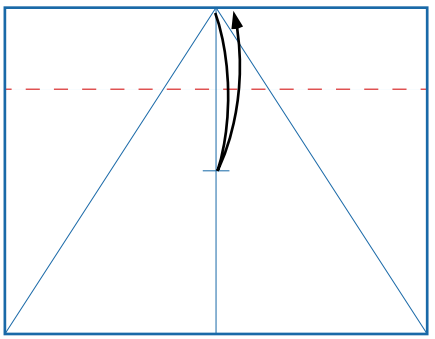
4. Fold this side to match the other side.



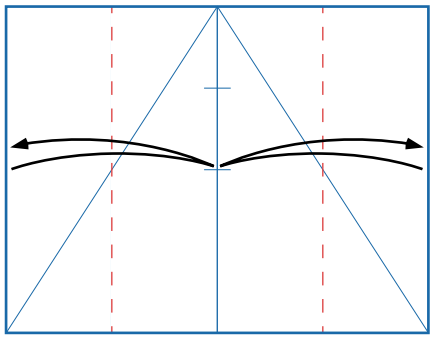
5. Unfold the paper to match the illustration in step 6.



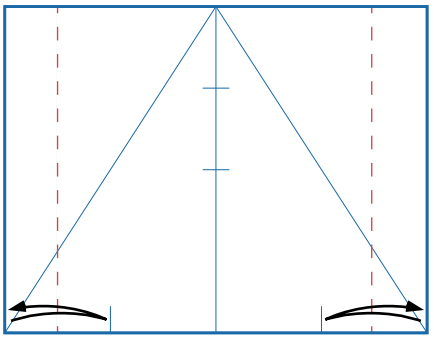
6. Fold the paper in half, but only crease the point right on the vertical center crease. This is called a pinch crease. Unfold.



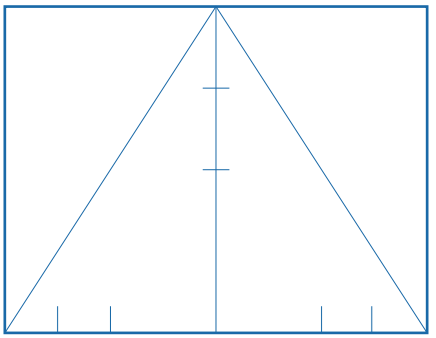
7. Fold the top edge to meet the pinch crease made in step 6. Pinch crease the center. Unfold.



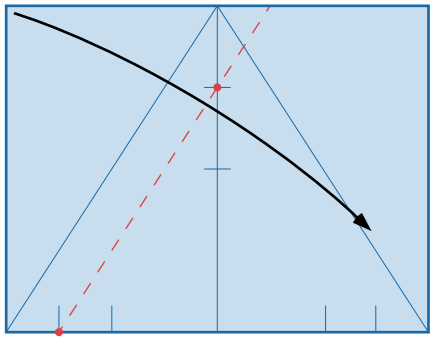
8. Fold the left and right edges in to the center of the paper. Pinch crease the bottom edge of the paper. Unfold.



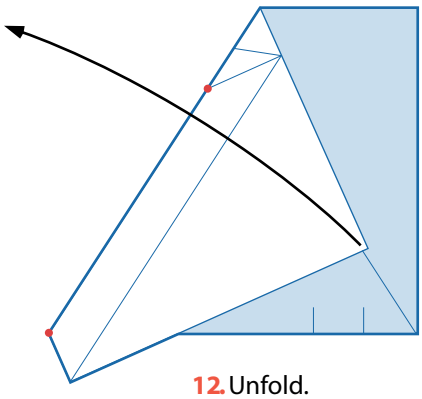
9. Fold the left and right edges in to meet the pinch creases made in step 8. Pinch crease the bottom edge of the paper and unfold.



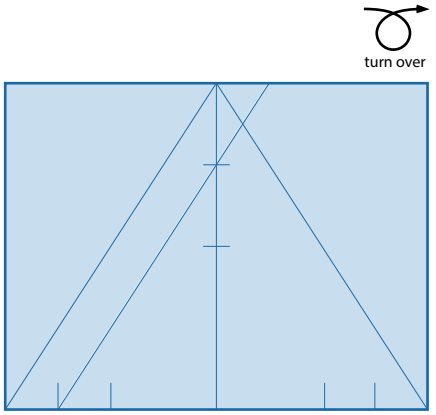
10. Turn the paper over.



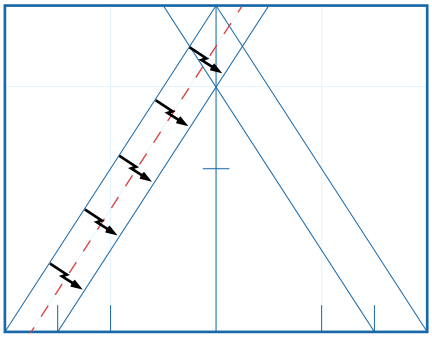
11. Fold, making a crease parallel to the existing diagonal. The crease will begin at the bottom of the left pinch crease and will go through the intersection marked by the top red dot. Notice that your references are for the crease. There is not a reference point for where the corner will fall.



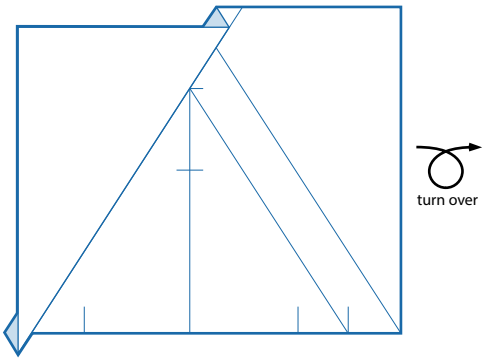
12. Unfold.



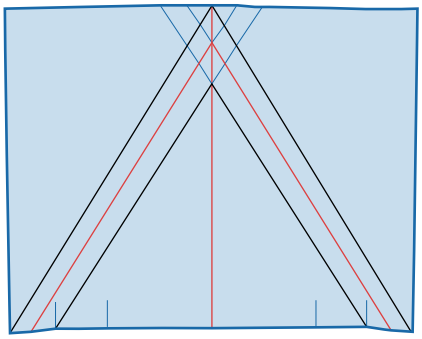
13. Repeat steps 11 and 12 on the right side and turn the paper over.



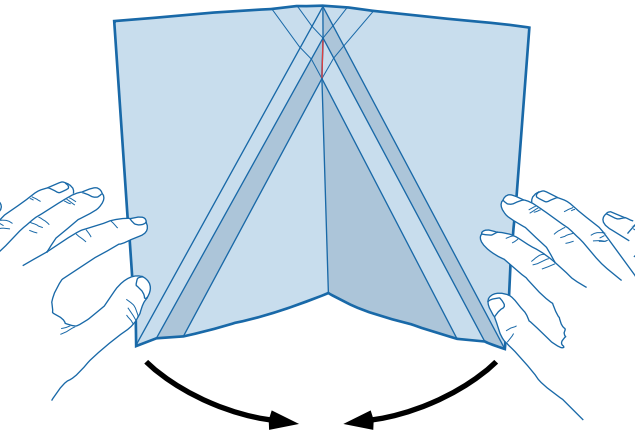
14. Create a third diagonal crease between the left two by pulling one crease to make it lie directly over the other.



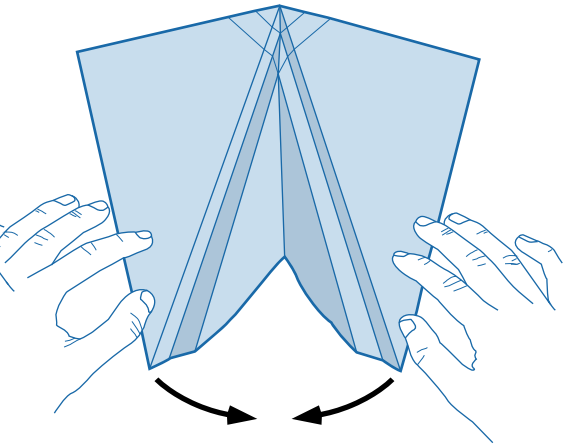
15. Unfold. Repeat step 14 on the right side. Turn the paper over.



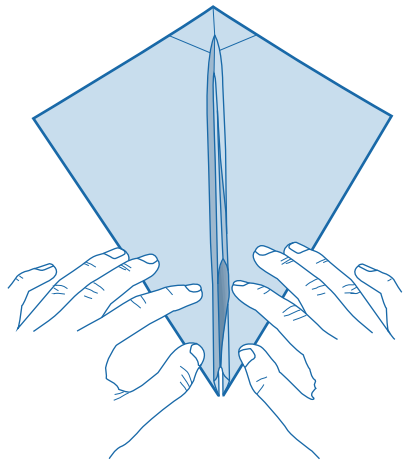
16. The red lines should be mountain folds, and the black lines should be valley folds.



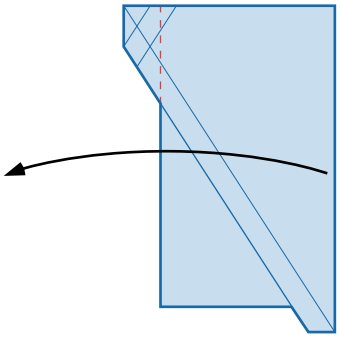
17a. With the paper starting flat on the table, swing the bottom corners in toward each other. As you swing the corners, the section of the center crease highlighted in red will need to be reversed so that it is a valley.



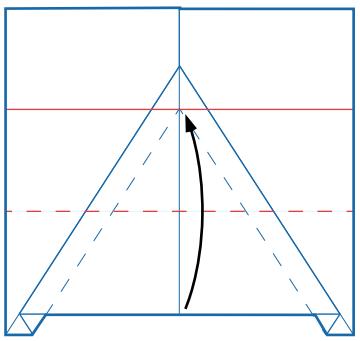
17b. Continue to swing the corners inward, allowing a peak to form in the center of the paper.



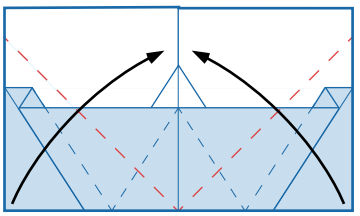
17c. Once the corners have met, pick the paper up and lay it back down to match the illustration in step 18.



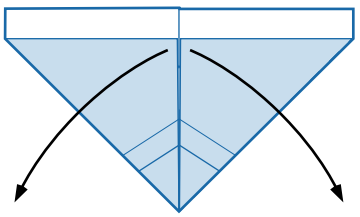
18. Open the right edge of the paper, making a crease on the dotted line as you do so.



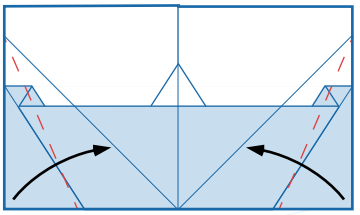
19. Fold the middle portion of the bottom edge to meet the point where the diagonal layers meet on the opposite side of the paper. This is indicated by the blue x-ray lines.



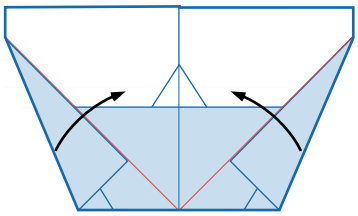
20. Fold the bottom corners in to meet the center.



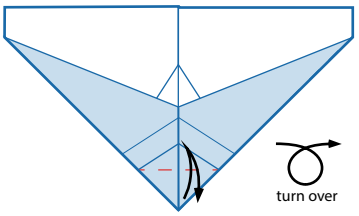
21. Unfold.



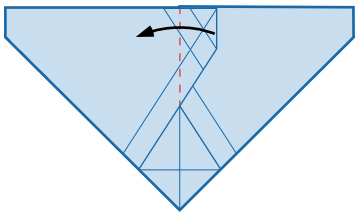
22. Fold the corners in to meet the crease made in step 20.



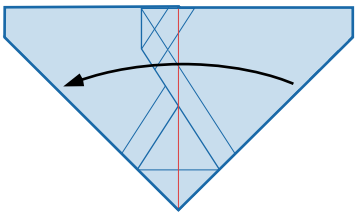
23. Fold in on the existing creases.



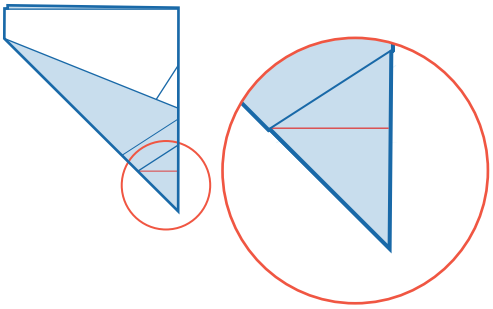
24. Fold the bottom point on the indicated line. Unfold and turn the paper over.



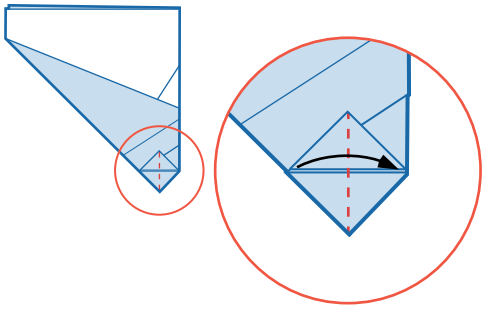
25. Fold the tail fin to the left.



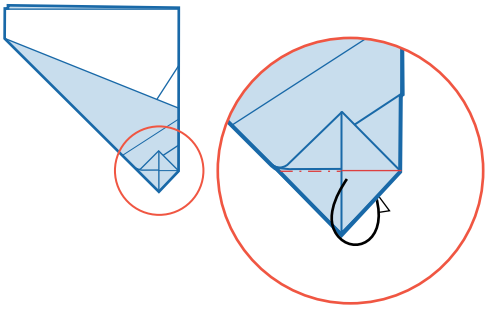
26. Fold the plane in half on the existing crease.



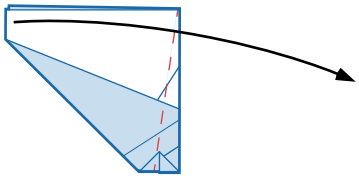
27. Stand the nose of the plane vertically, using the existing crease and squash fold it to match the illustration in step 28. (To learn how to squash fold, refer to the glossary of folds on page 7.)



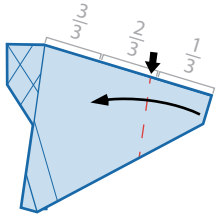
28. Fold the left point of the squash fold to meet the right point.



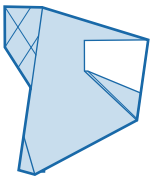
29. Mountain-fold the bottom point of the squash fold behind. This will later serve to lock the nose of the plane in shape.



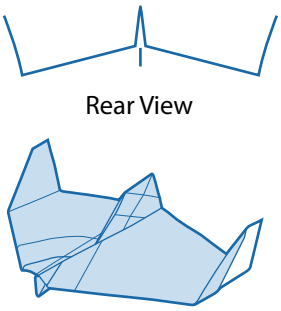
30. Fold the wing on the indicated line. The crease should start just to the left of that bottom triangle and should end at the top right corner of the plane. Do both sides.



31. Fold the winglets slightly larger than a third of the width of the wing and make them parallel with the center of the plane.

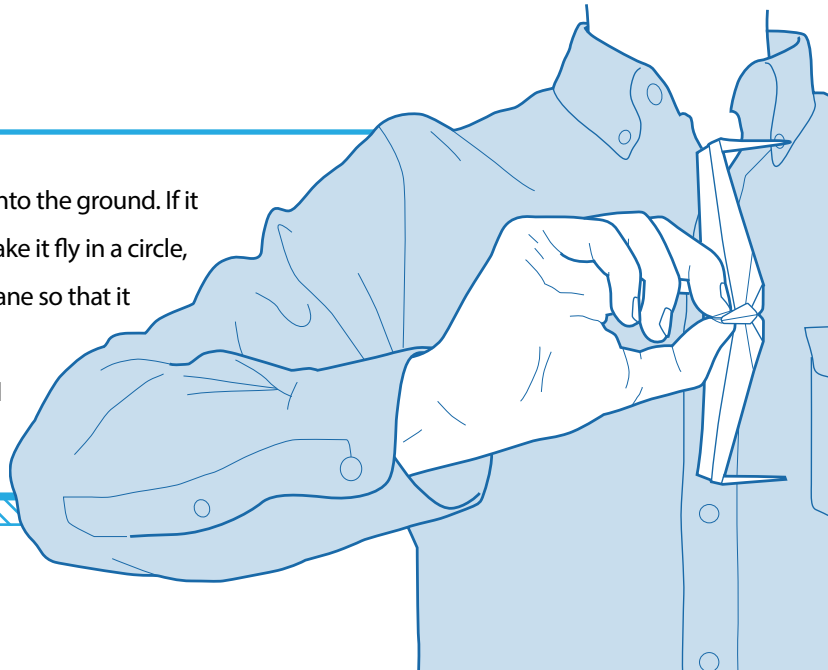


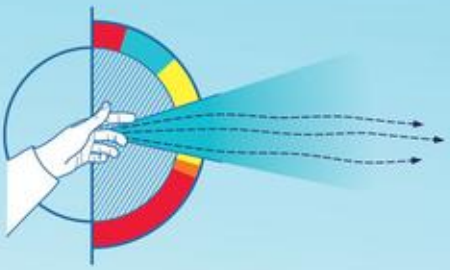
32. Open the wings and set them at the angles illustrated by the rear view.

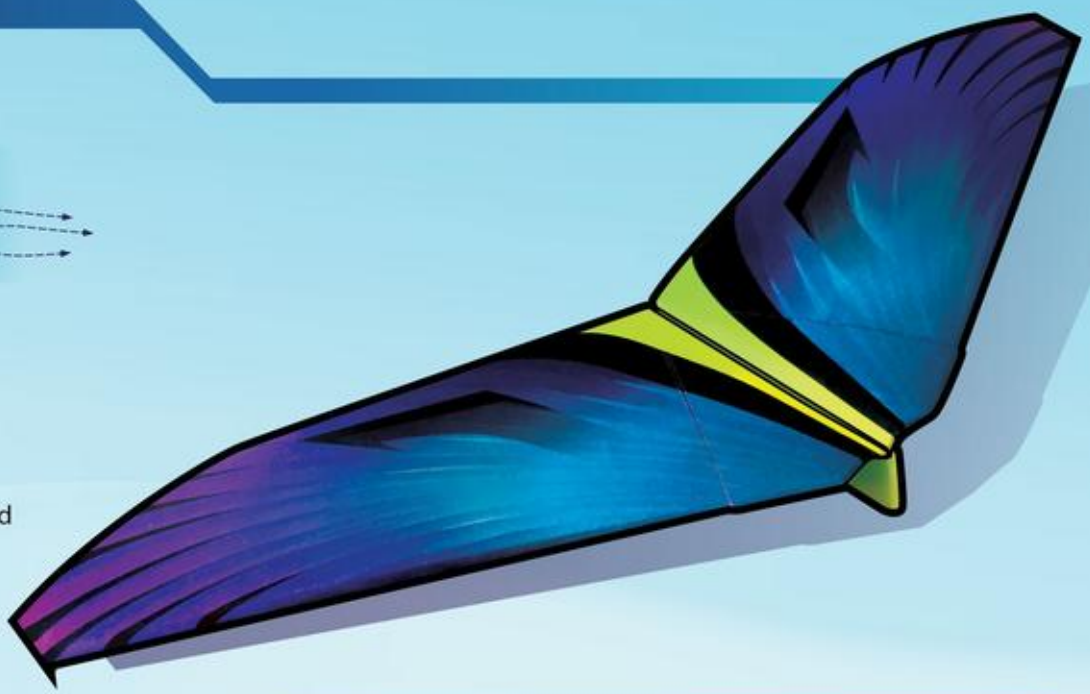


33. Finished!

Throwing Tip: When you throw Zoomerang normally, it should dive into the ground. If it doesn't dive, just bend the back edges of the wings down slightly. To make it fly in a circle, give the wings anhedral angle (learn more on page 15) and hold the plane so that it is perpendicular to the ground. Try dropping your forearm inward and throwing it as you might throw a bounce pass in basketball. If you're still having trouble, be sure to watch the video for a full throwing tutorial.







Swallow

Type: Glider **Difficulty:** Advanced

Speed

Glide

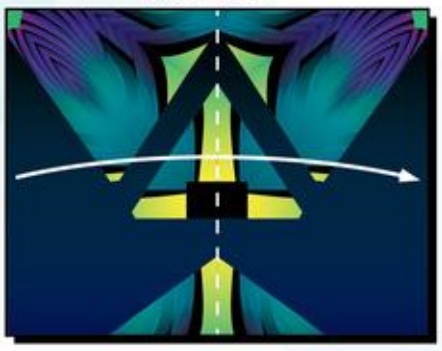
Accuracy

Click the QR Code to watch a video tutorial for this plane!

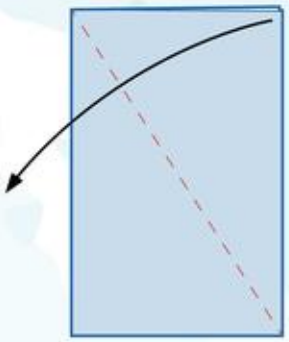
Or go to foldableflight.com/ipa-13-swallow

The folding sequence for Swallow is very similar to that of Zoomerang, but their appearance and flight characteristics are very different. Swallow is fairly difficult to fold, and it doesn't boast the most impressive range or glide of the planes in this book, but it is certainly a sight to behold in the air. With its wide, swept back wings, Swallow bobs and weaves just like the bird itself!

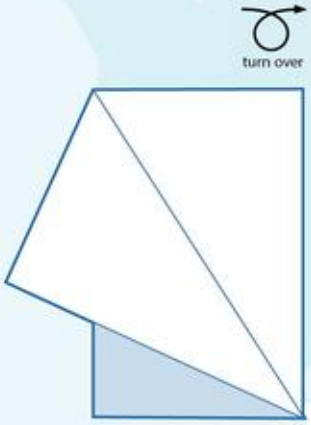
11 in x 8.5 in



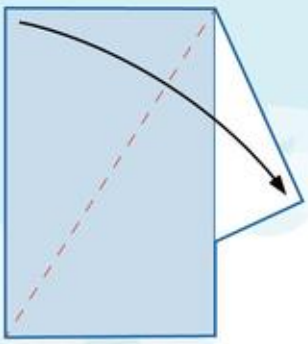
1. Fold the paper in half.



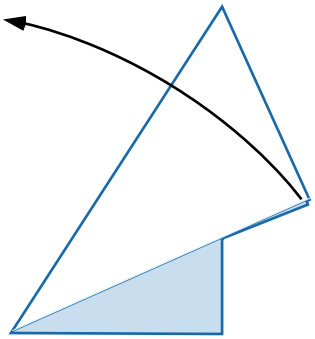
2. Fold the top right corner diagonally, creasing from the top left corner to the bottom right corner.



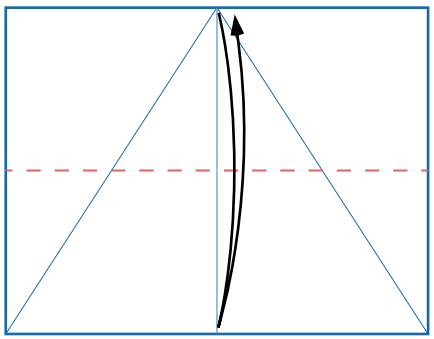
3. Turn the paper over.



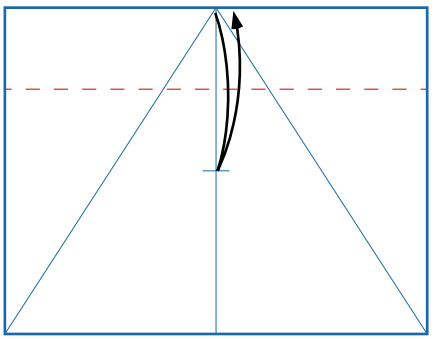
4. Fold this side to match the other side.



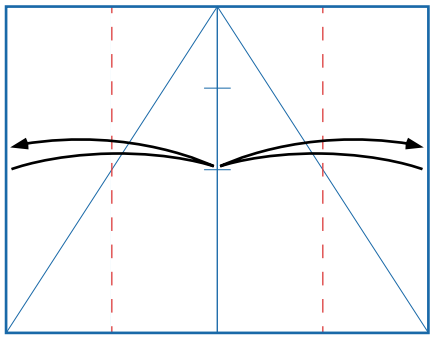
5. Unfold the paper to match the illustration in step 6.



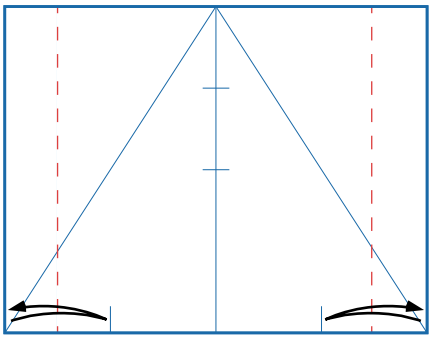
6. Fold the paper in half, but only crease the point right on the vertical center crease. This is called a pinch crease. Unfold.



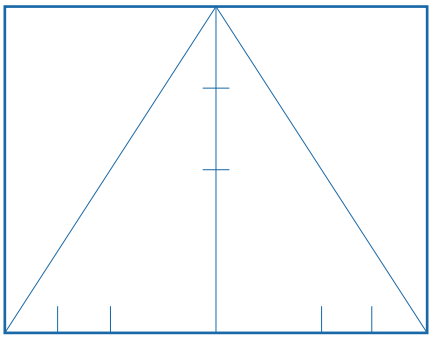
7. Fold the top edge to meet the pinch crease made in step 6. Pinch crease the center. Unfold.



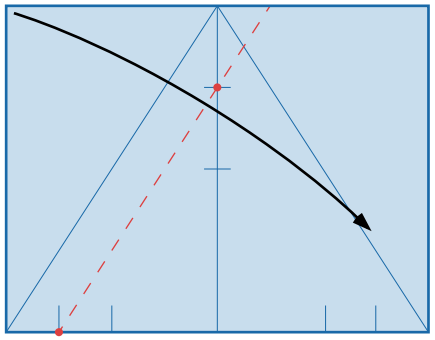
8. Fold the left and right edges in to the center of the paper. Pinch crease the bottom edge of the paper. Unfold.



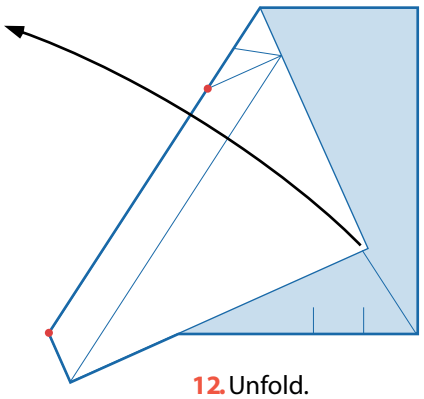
9. Fold the left and right edges in to meet the pinch creases made in step 8. Pinch crease the bottom edge of the paper and unfold.



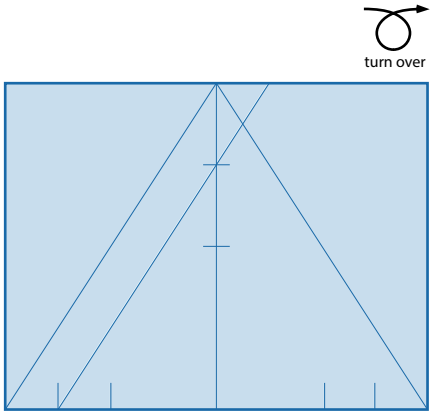
10. Turn the paper over.



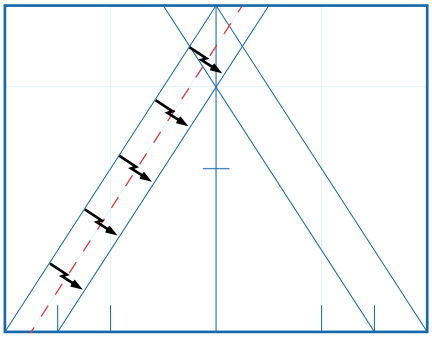
11. Fold on a crease parallel to the existing diagonal. The crease will begin at the bottom of the left pinch crease and will go through the intersection marked by the top red dot. Notice that your references are for the crease. There is not a reference point for where the corner will fall.



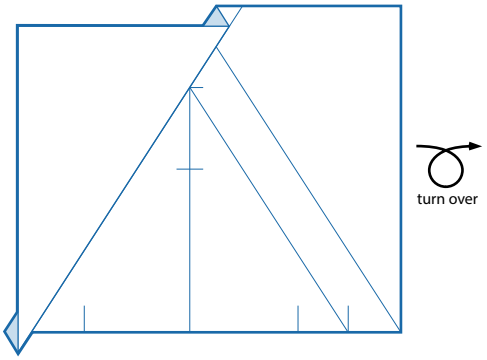
12. Unfold.



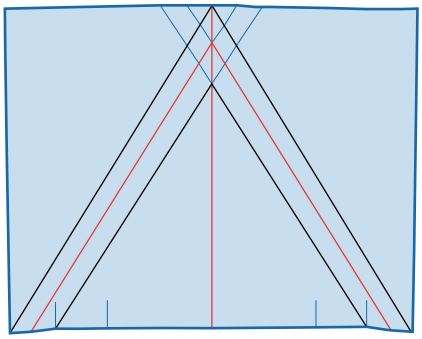
13. Repeat steps 11 and 12 on the right side and turn the paper over.



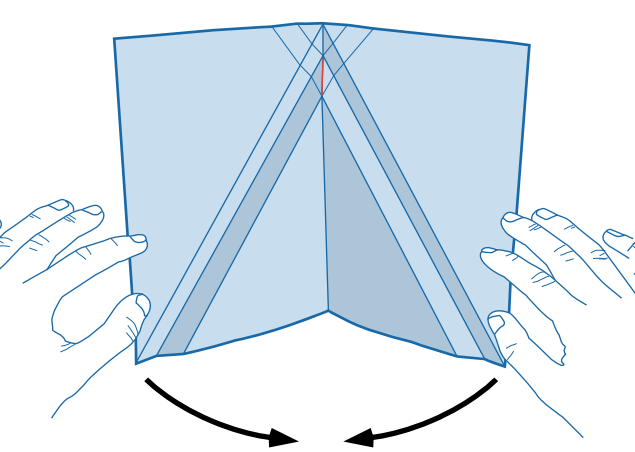
14. Create a third diagonal crease between the left two by pulling one crease to make it lay directly over the other.



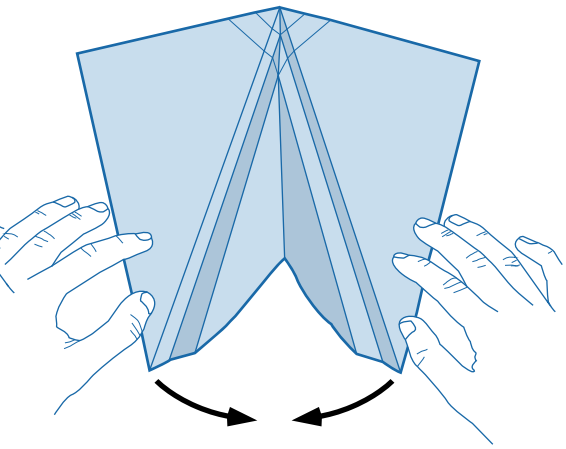
15. Unfold. Repeat step 14 on the right side. Turn the paper over.



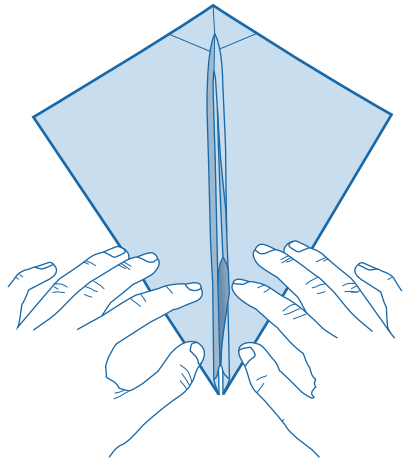
16. The red lines should be mountain folds, and the black lines should be valley folds.



17a. With the paper starting flat on the table, swing the bottom corners in toward each other. As you swing the corners, the section of the center crease highlighted in red will need to be reversed so that it is a valley.

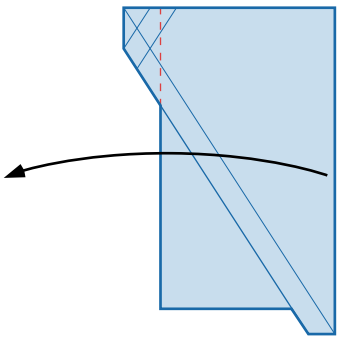


17b. Continue to swing the corners inward, allowing a peak to form in the center of the paper.

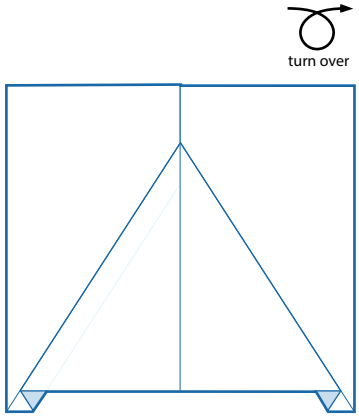


17c. Once the corners have met, pick the paper up and lay it back down to match the illustration in step 18.

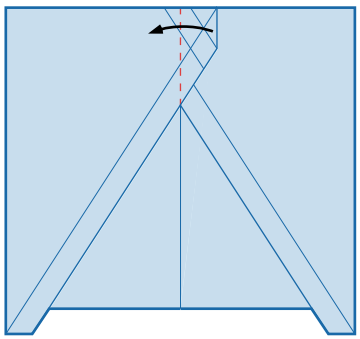
Step 21 is tricky. If you're struggling, be sure to watch the video tutorial for help.



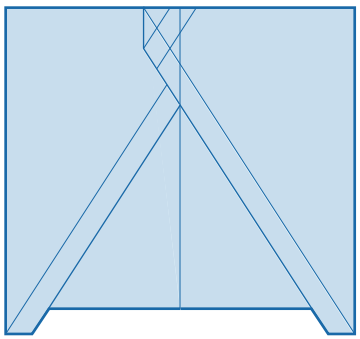
18. Open the right edge of the paper, making a crease on the dotted line as you do so.



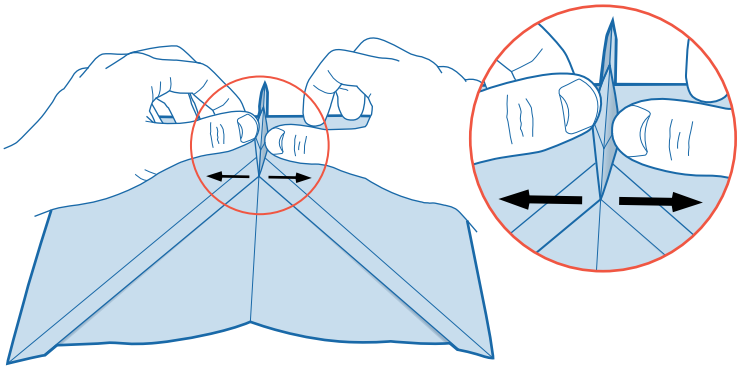
19. Turn the paper over.



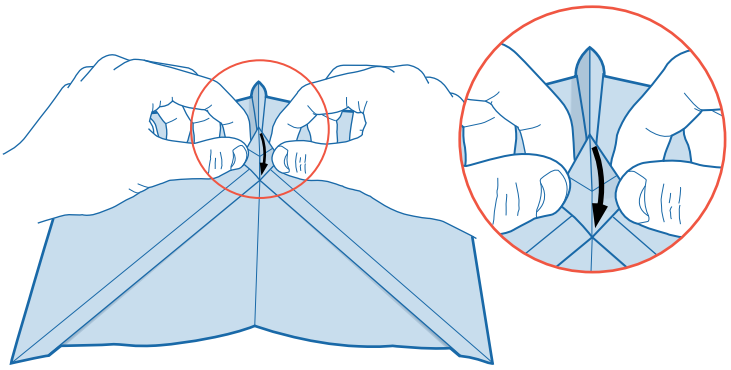
20. Fold the flap to the left.



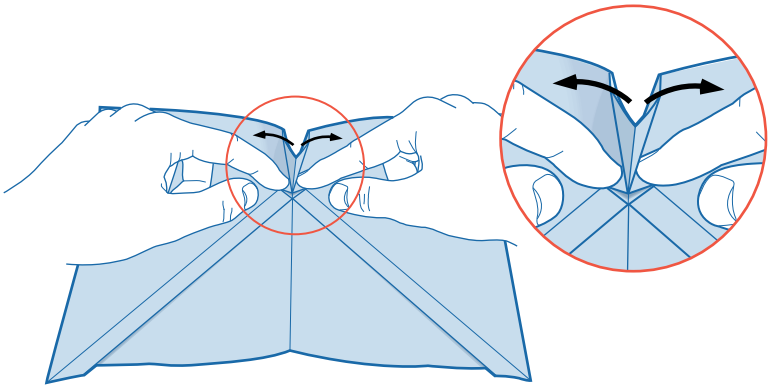
21a. Stand the flap vertically and use your thumbs to open the pocket on the front of the flap.



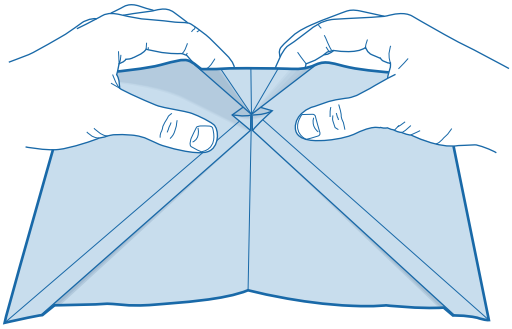
21b. Continue to open the pocket until its as wide as it will go and the top edge of the paper begins to pull towards you.



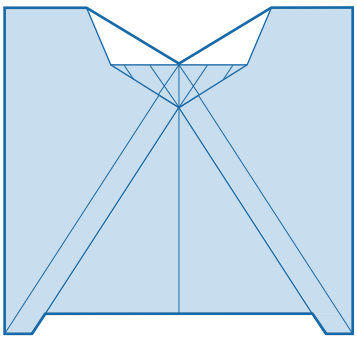
21c. Pull the top point of the pocket down to meet the bottom point of the pocket. This will pull the top edge of the paper so that it is standing in the air. Flatten the edges of the pocket.



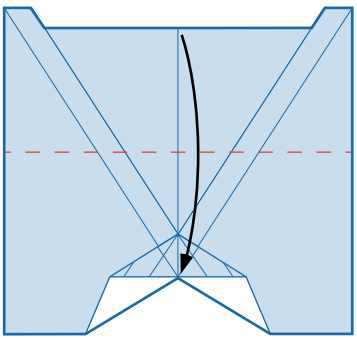
21d. Reach behind the top edge of the paper and fan it out to look like the illustration in step 21e.



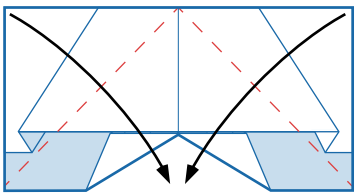
21e. Flatten the paper to look like the illustration in step 22.



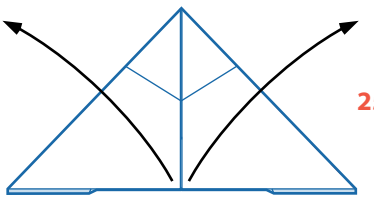
22. Rotate the paper 180 degrees.



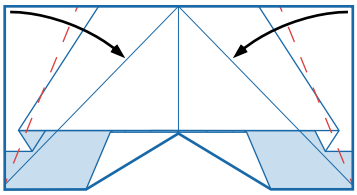
23. Fold the top edge of the paper down to meet the point of the missing triangle.



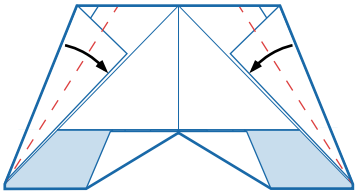
24. Fold the top corners in so that they meet in the middle.



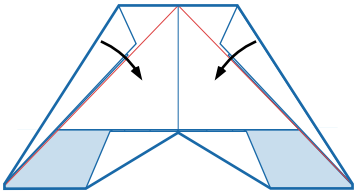
25. Unfold.



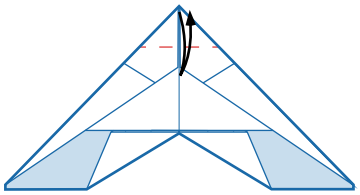
26. Fold the edges in to almost meet the creases made in step 24. Leave just a small gap.



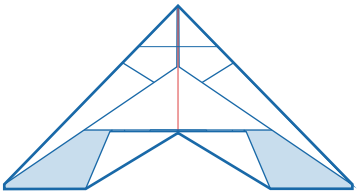
27. Fold the edges in again to almost meet the creases made in step 24. Again, leave a small gap.



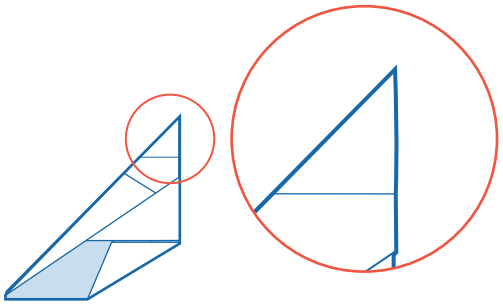
28. Fold in on the existing creases made in step 24.



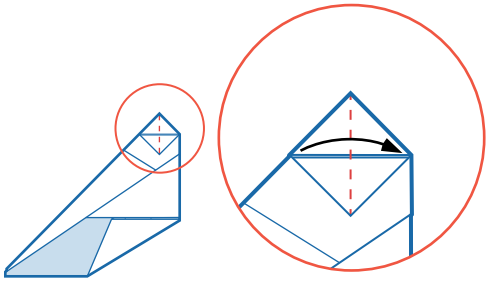
29. Fold the nose down on the indicated line. The nose should easily fold there because the plane is more thickly layered just below that line. Unfold.



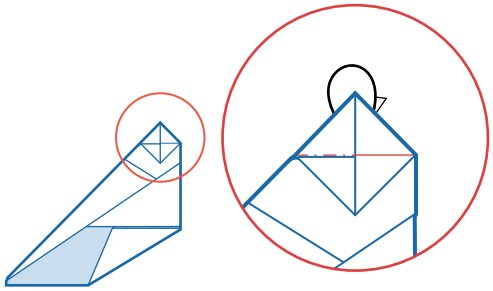
30. Mountain fold the plane in half on the existing crease.



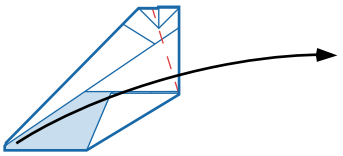
31. Stand the nose vertically on the existing crease and squash fold it to look like the illustration in step 32. (To learn how to squash fold, refer to the glossary of folds on page 7.)



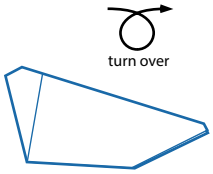
32. Fold the left point of the squash fold to meet the right.



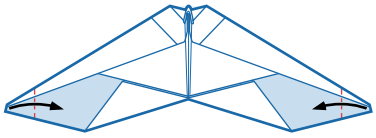
33. Mountain fold the top point of the squash fold behind. This will later serve to lock the nose of the plane in shape.



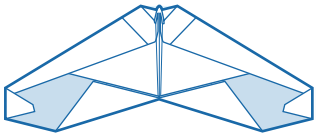
34. Fold each wing on the indicated line. Start just above the triangular lock on the front of the plane, and end the at the corner of the plane, as illustrated.



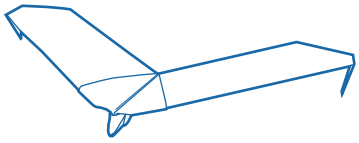
35. Open the wings and turn the plane over.



36. Fold winglets parallel to the center crease on the indicated lines.

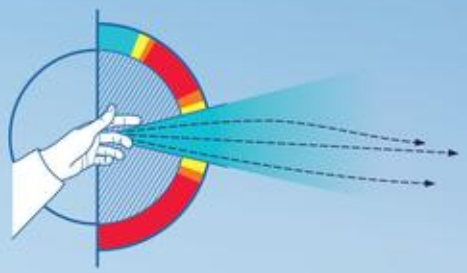


37. Open the winglets.



38. Finished!

Throwing Tip: Make sure Swallow's wings are flat all the way across (rather than angled up or down) and throw Swallow level to the ground or high into the air. It should bob and weave through the air just like its namesake!



Zephyr

Type: Glider **Difficulty:** Expert

Speed

Glide

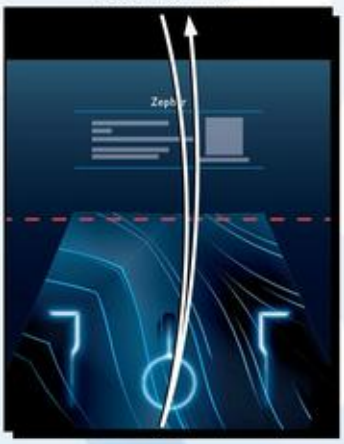
Accuracy

Click the QR Code to watch a video tutorial for this plane!

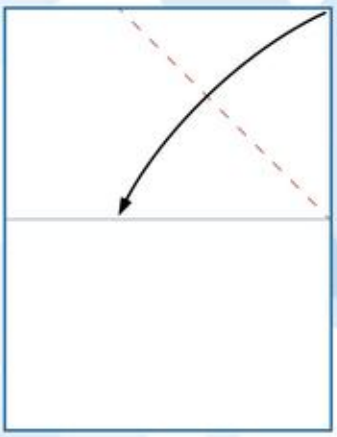
Or go to foldableflight.com/ipa-14-zephyr

I have many "favorites," but there is no point in denying it: Zephyr is my single favorite paper airplane, and I don't see that changing anytime soon. I view my paper airplanes as functional sculptures, and no plane captures that spirit more completely than Zephyr. Its lack of a center crease and clever folding techniques allow it to possess an unparalleled beauty in its undulating form. I know it may not be as visually exciting as Spectre, Sentry, or F-80 Centurion, but with its grace, both in form and in flight, this plane may just be my greatest creation.

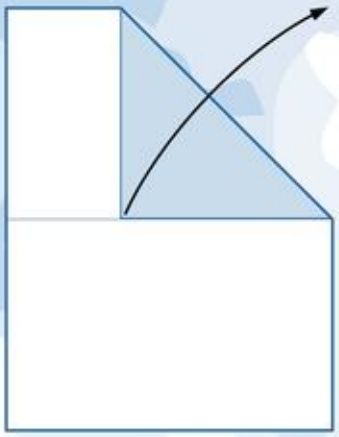
8.5 in x 11 in



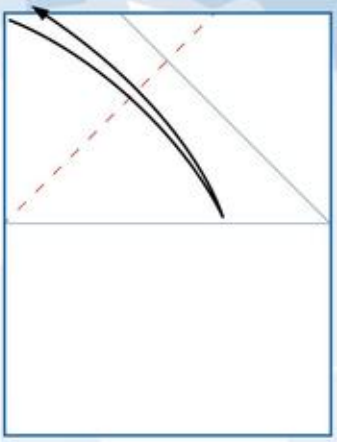
1. Fold the paper in half. Unfold.



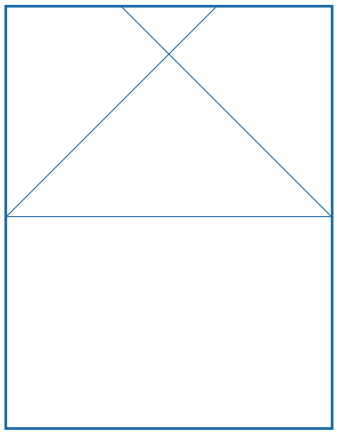
2. Fold the right corner so that the right edge of the paper lines up with the crease made in step 1.



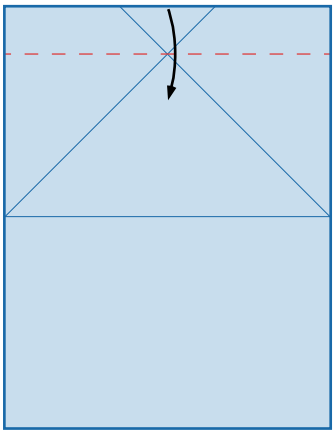
3. Unfold.



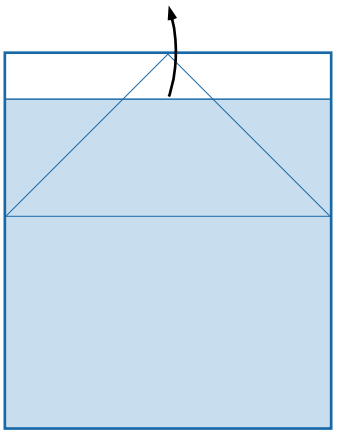
4. Repeat steps 2 and 3 on the left side.



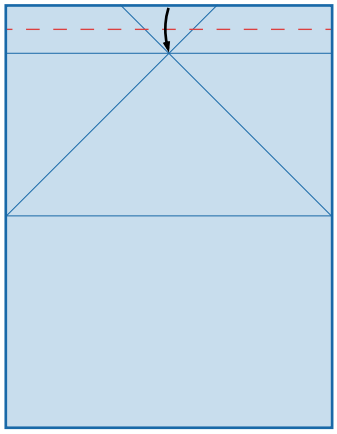
5. Turn the paper over.



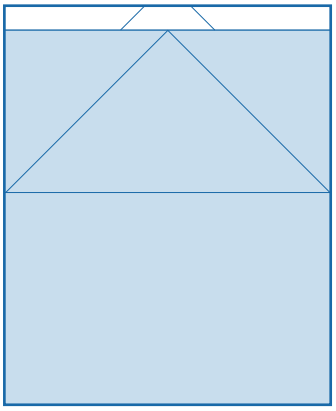
6. Fold the top of the paper down, creasing through the intersection as shown.



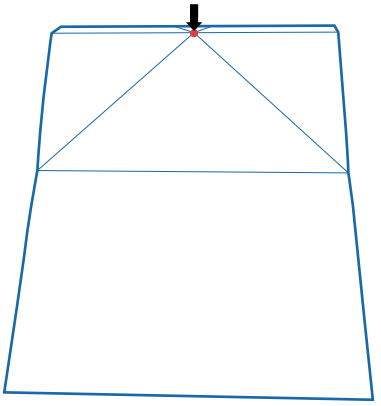
7. Unfold.



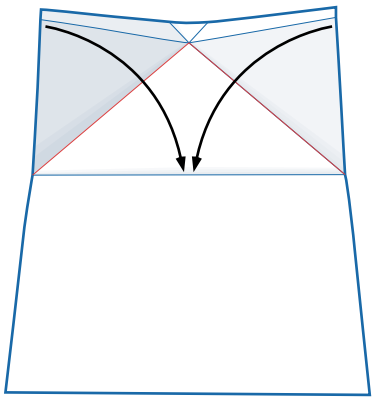
8. Fold the top edge to meet the crease made in step 6.



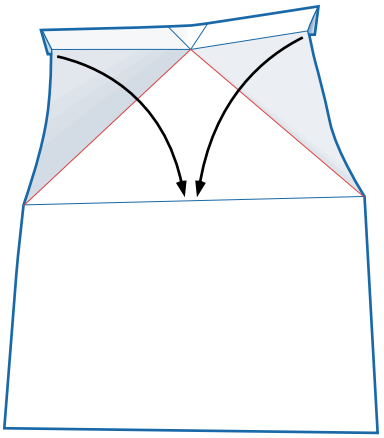
9. Turn the paper over.



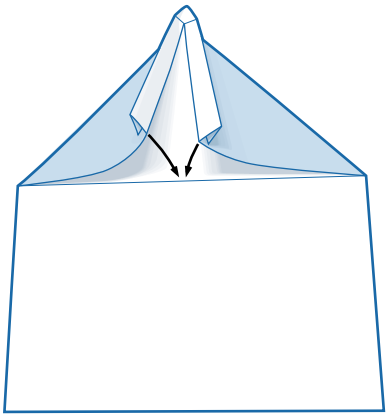
10a. Poke the intersection marked by the red dot. This should make the sides of the paper pop up as illustrated in step 10b.



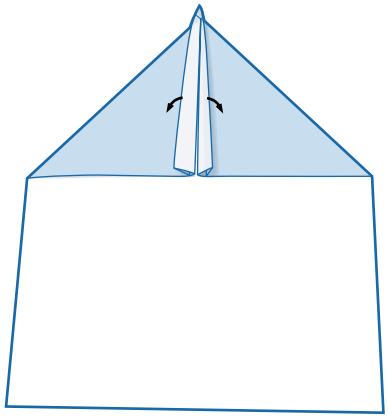
10b. Begin folding in on the creases highlighted in red.



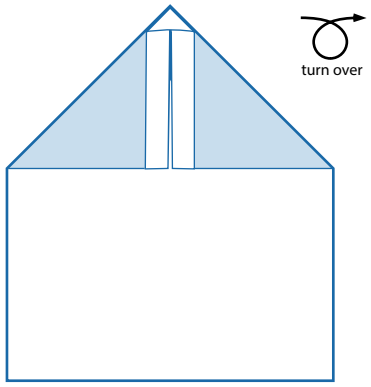
10c. Continue folding in on the creases highlighted in red.



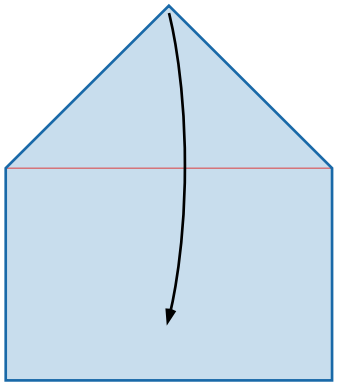
10d. Lay the triangular flaps of the paper flat on the table to match step 10e.



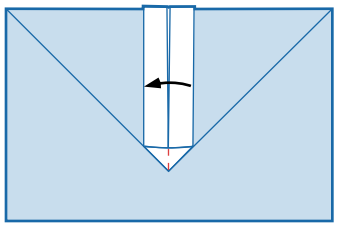
10e. Flatten the central flaps to match the illustration in step 11.



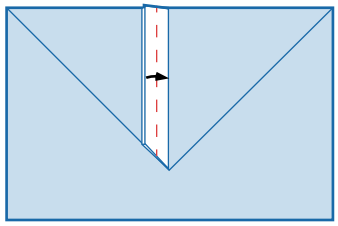
11. Turn the paper over.



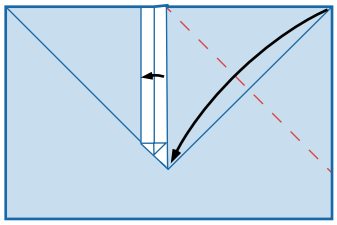
12. Fold down on the existing crease.



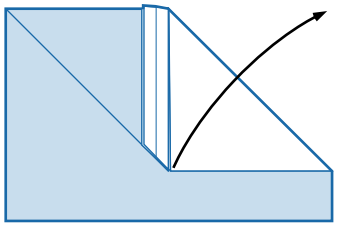
13. Fold the right flap to the left.



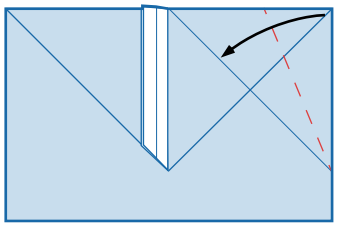
14. Fold the left edge of the top flap to line up with its right edge.



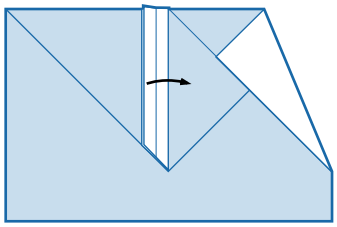
15. Unfold the flap folded in step 14. Fold the top right corner down to meet the center point of the triangle.



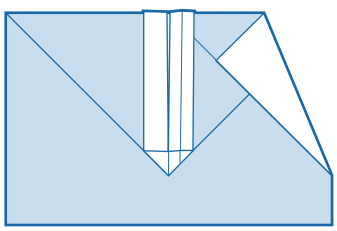
16. Unfold.



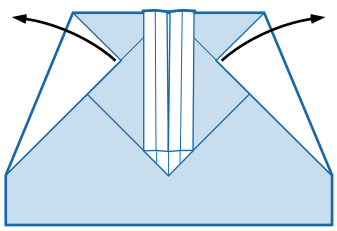
17. Fold the right edge in to meet the crease made in step 15.



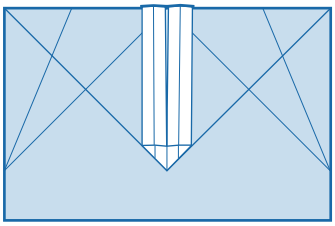
18. Fold the flap back to the right.



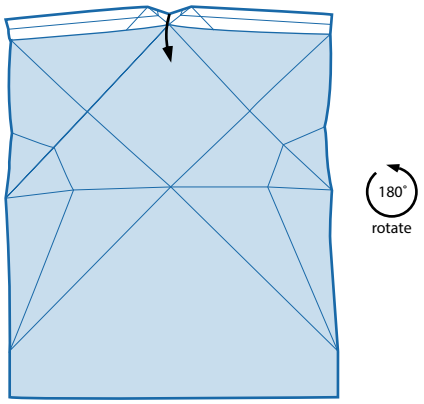
19. Repeat steps 13 through 18 on the left side.



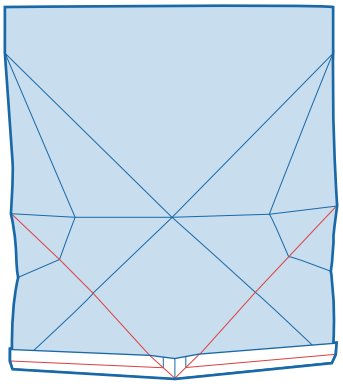
20. Unfold the creases made in step 17.



21. Unfold everything except the narrow layer at the very top of the paper.

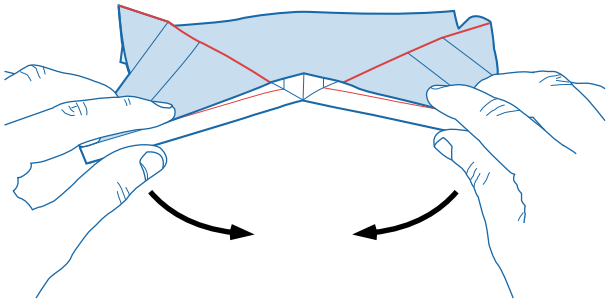


22. Fold the top layer down on the existing crease and rotate the paper 180 degrees.

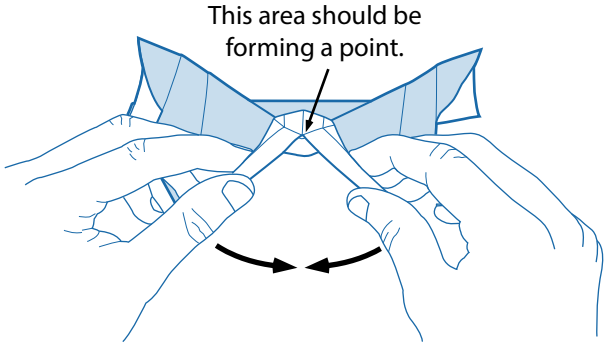


23a. Grab the paper by the bottom corners. In steps 23b. through 23d. you will be folding on the creases highlighted in red.

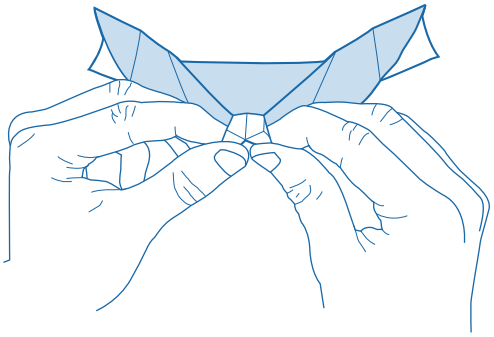
Step 23 is tough to illustrate. If you're struggling, be sure to watch the video tutorial for help.



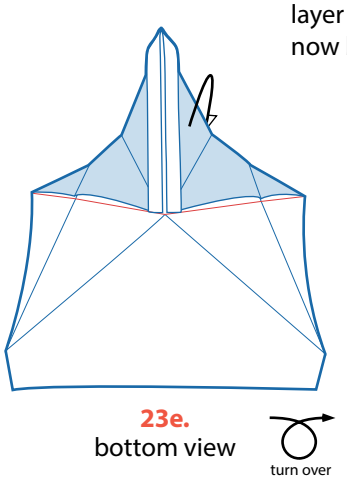
23b. Begin to swing the corners in on the existing creases. As you do, pinch the outer edges of the narrow top layer (depicted in white). It should begin to fold it in half on the existing crease.



23c. Continue to swing the corners inward and pinch what was the top layer closer to the point that should now be forming.

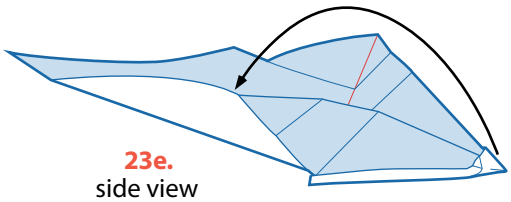


23d. Once the corners have met in the middle, there should be a 3-dimensional shape that terminates in a point. Refer to step 23 e to see what it should look like from the side and bottom.

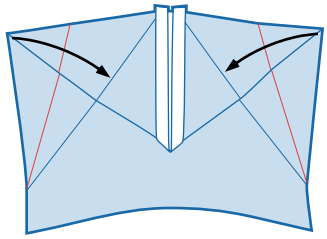


23e. bottom view

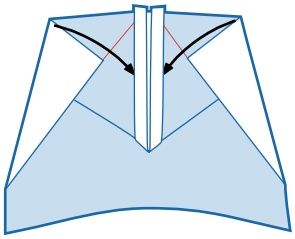
23e. Mountain fold the paper on the very first crease you made (highlighted in red) and turn the paper over.



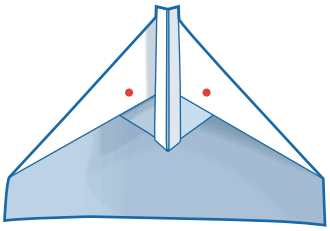
23e. side view



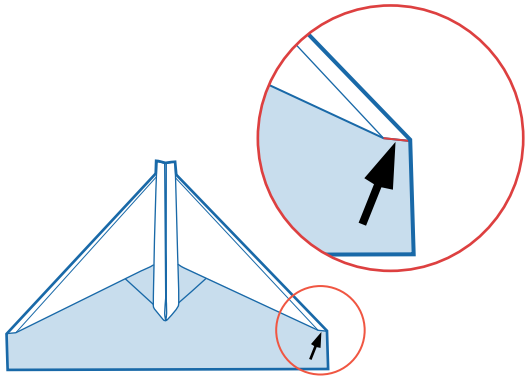
24. The paper will not want to lie flat, but that's fine. Realign the creases and fold in on the outer creases.



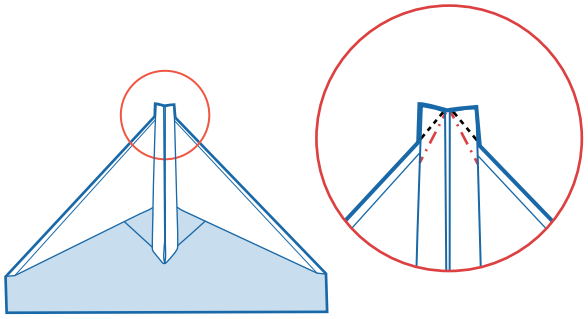
25. Fold in again on the existing creases, tucking the layers into the center fuselage. The plane still won't lay flat.



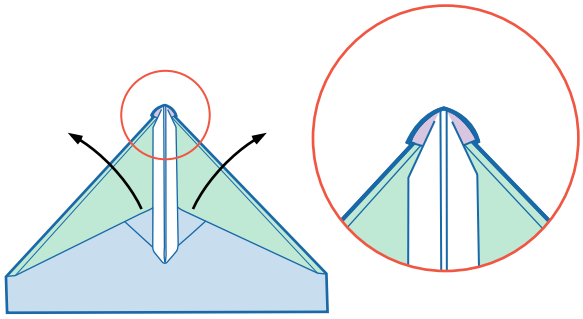
26. Place your thumb and forefinger on the red dots and press down. Recrease the outside edges of the plane to flatten them, while trying to maintain symmetry in your plane. Read step 27 before completing this step.



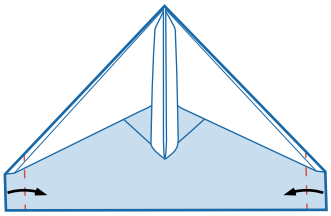
27. Make sure the (very) short side of your top layer (highlighted in red) is the same length on both sides of the plane. You may need to adjust and recrease one side. Try to avoid making this edge too long and match the illustration as closely as you can.



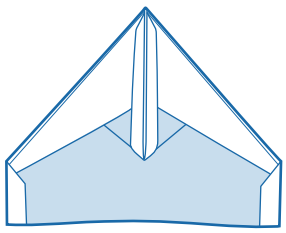
28. Mountain fold the nose of the plane approximately on the lines shown in red. Then, on the black lines, valley fold a small portion of the tab back out to match the illustration in step 29. If that doesn't make sense, consider watching the video tutorial.



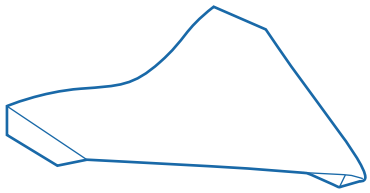
29. Unfold the layers on the bottom of the wing (highlighted in green) just enough to tuck the purple tabs under it. Fold the layers back into place.



30. Fold the winglets parallel to the center fuselage a little less than half an inch from the edges of the plane.

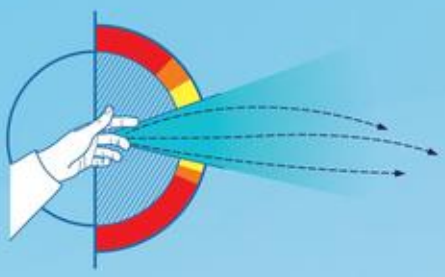


31. Open the winglets.



32. Finished!

Throwing Tip: Zephyr is as pretty as a paper airplane can get. Its uninterrupted wing is totally unique, and its curves are gorgeous. Thrown properly, Zephyr will glide exceptionally well, but the technique for throwing it is hard to perfect. Don't tilt the plane to the side as you throw it, or you'll find yourself crashing more often than flying. You can throw Zephyr high into the air or even slightly downward, and it should fly beautifully in either scenario.



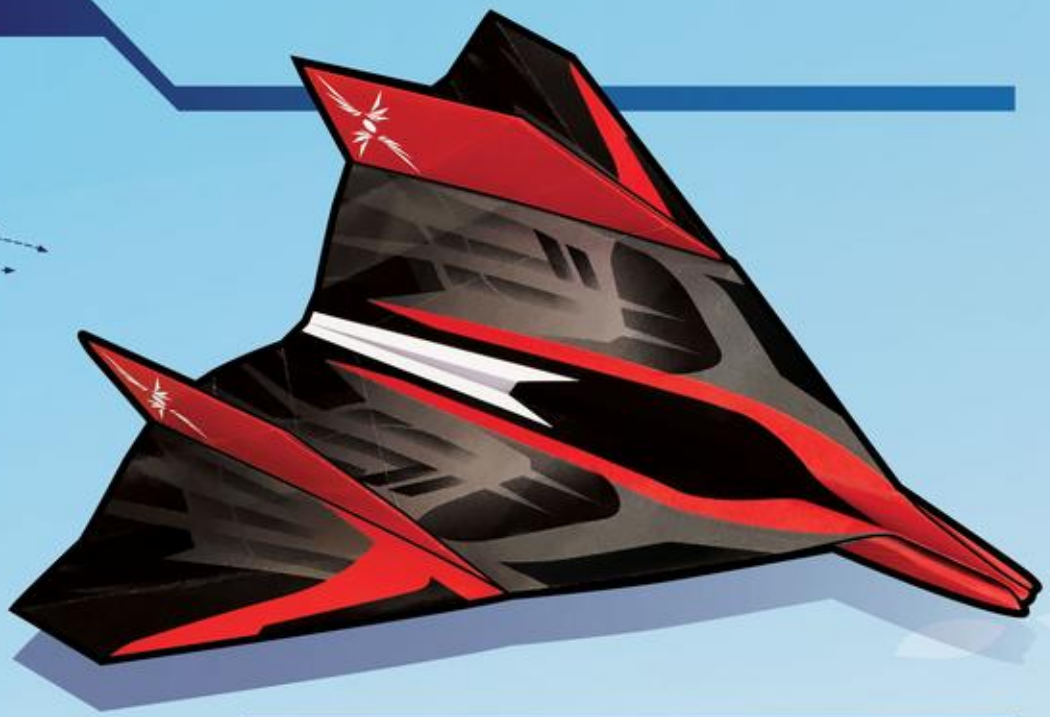
F-80 Centurion

Type: Hybrid **Difficulty:** Advanced

Speed

Glide

Accuracy



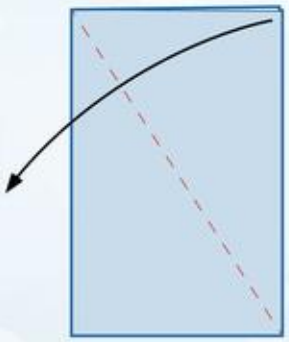
Click the QR Code to watch a video tutorial for this plane!

Or go to foldableflight.com/ipa-15-f-80centurion

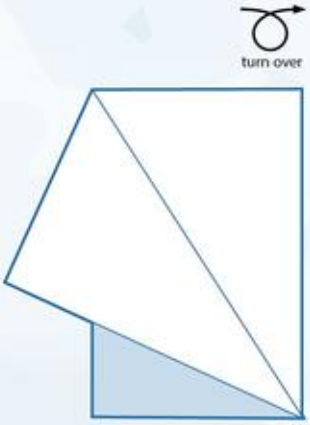
The concept for F-80 Centurion was (like that of Swallow) born out of my experimentations with Zoomerang. If you've folded that plane, you'll notice that the folding sequence for F-80 Centurion is strikingly similar, while diverging in some important ways. The result is a plane that bears a signature fighter jet appearance, while also maintaining favorable flight characteristics. The folding sequence is difficult (probably the hardest in the book), but the end result is a paper airplane that looks wicked and flies brilliantly!

11 in x 8.5 in

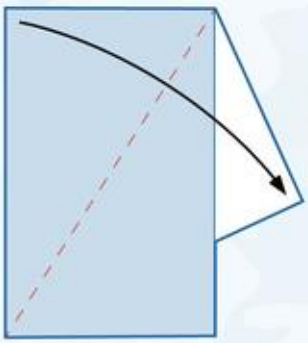
1. Fold the paper in half.



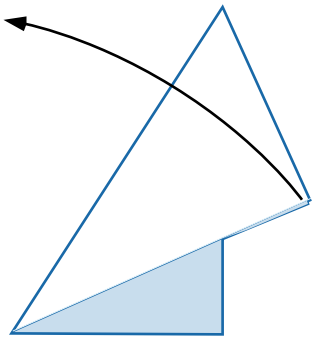
2. Fold the top right corner diagonally, creasing from the top left corner to the bottom right corner.



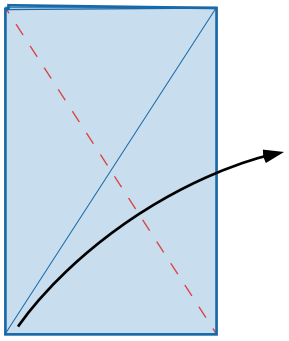
3. Turn the paper over.



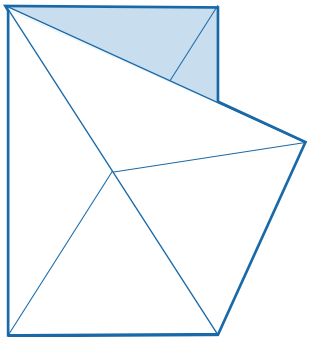
4. Fold this side to match the other side.



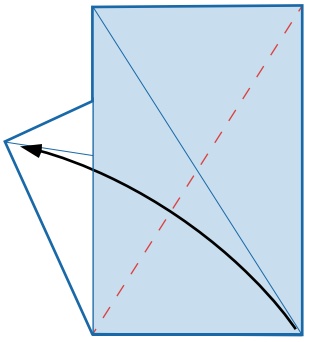
5. Unfold the folds made in steps 2 and 4.



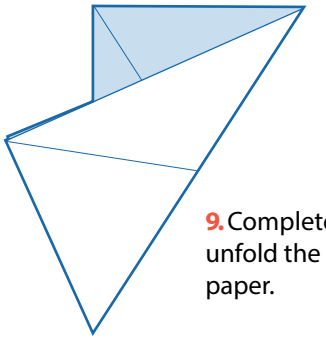
6. Fold the bottom left corner diagonally, creasing from the bottom right corner to top left corner.



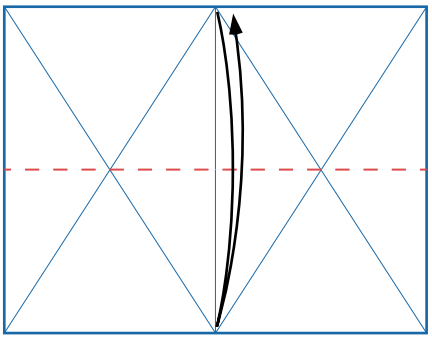
7. Turn the paper over.



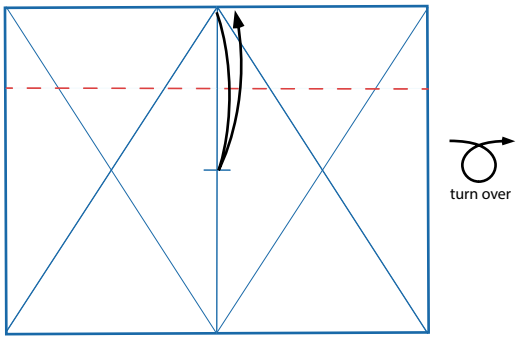
8. Fold this side to match the other side.



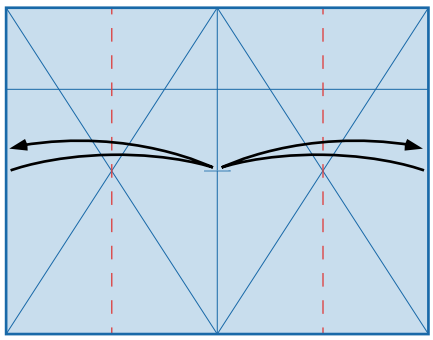
9. Completely unfold the paper.



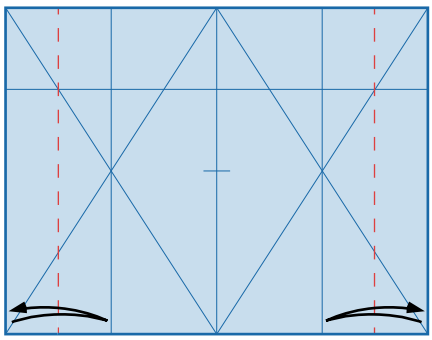
10. Fold the paper in half, but only crease the point right on the vertical center crease. This is called a pinch crease. Unfold.



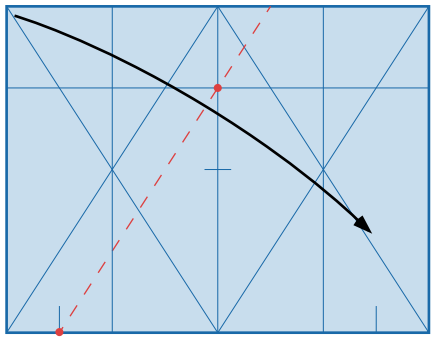
11. Fold the top edge down to meet the pinch crease made in step 10. Crease all the way across the fold. Unfold and turn the paper over.



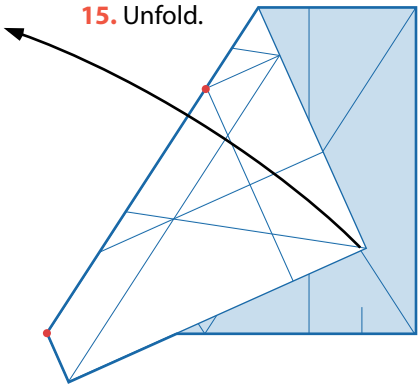
12. Fold the edges in to meet the center crease. Unfold.



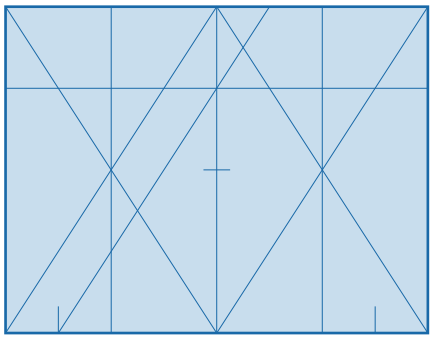
13. Fold the left and right edges in to meet the creases made in step 12. Pinch crease the bottom edge of the paper and unfold.



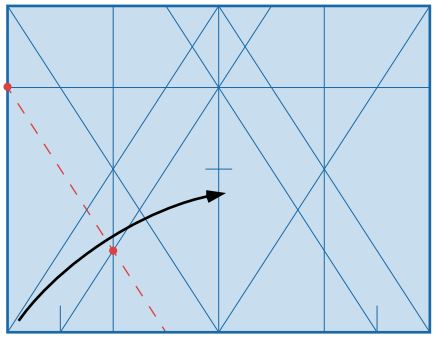
14. Fold on a crease parallel to the existing diagonal. The crease will begin at the bottom of the left pinch crease and will go through the intersection marked by the top red dot. Notice that your references are for the crease. There is not a reference point for where the corner will fall.



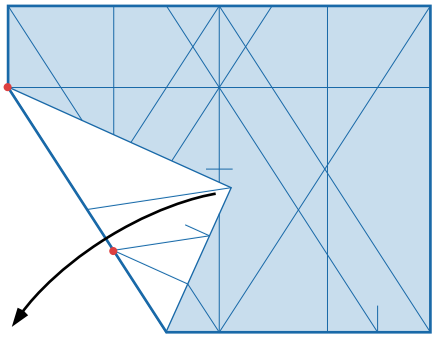
15. Unfold.



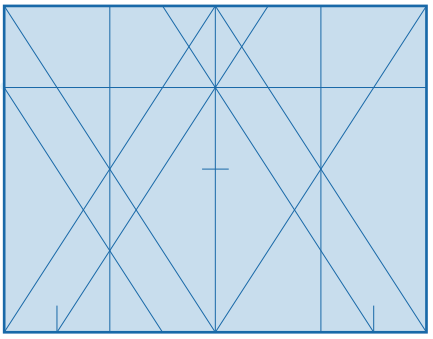
16. Repeat steps 14 and 15 on the right side.



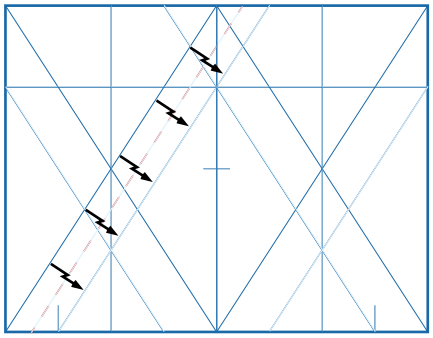
17. Fold on a crease parallel to the existing diagonal. The crease will begin where the horizontal crease near the top meets the left edge, and will go through the intersection marked by the lower red dot. The references are for the crease. There is not a reference point for where the corner will fall.



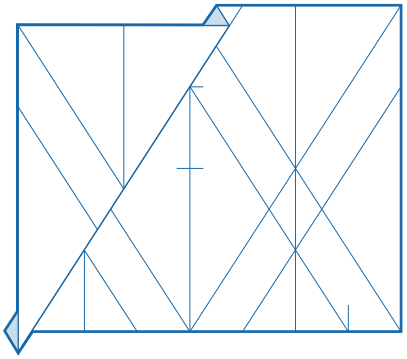
18. Unfold.



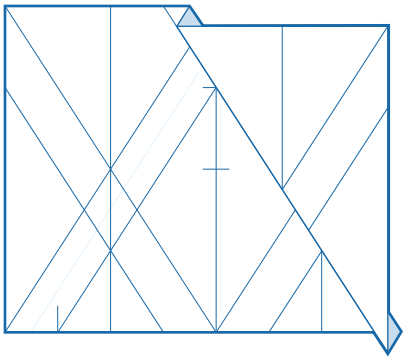
19. Repeat steps 17 and 18 on the right side, then turn the paper over.



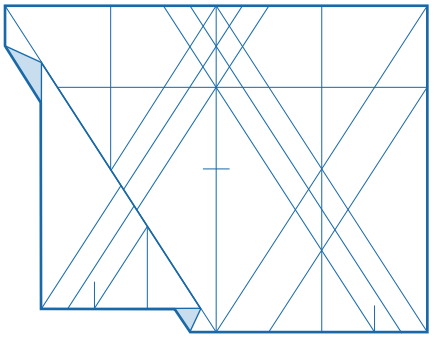
20. Create another diagonal crease by pulling one crease to make it lie directly over the other.



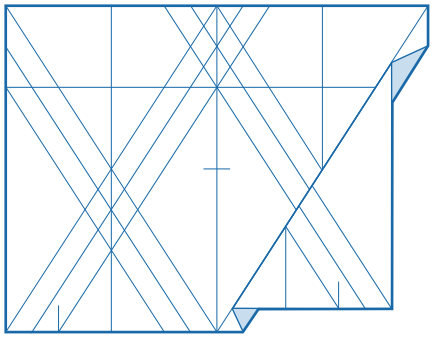
21a. Unfold. Do the same for each pair of diagonal creases. Until your paper looks like the illustration in step 22.



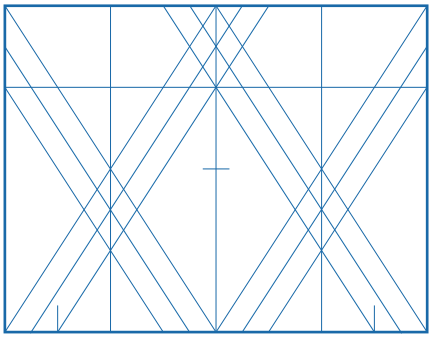
21b.



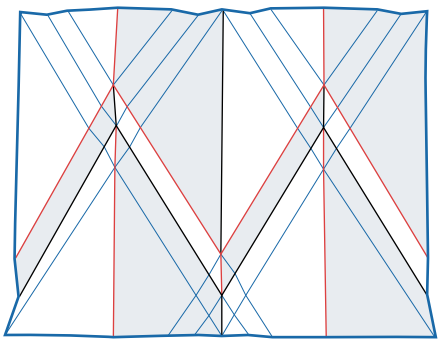
21c.



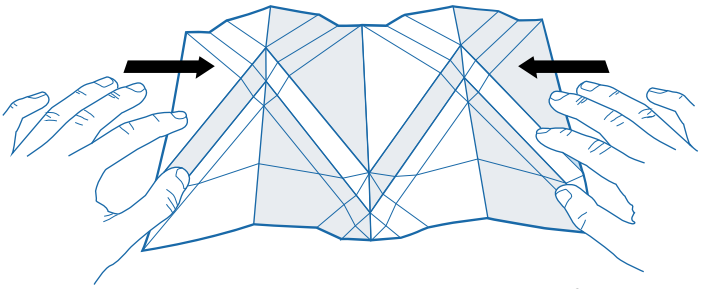
21d.



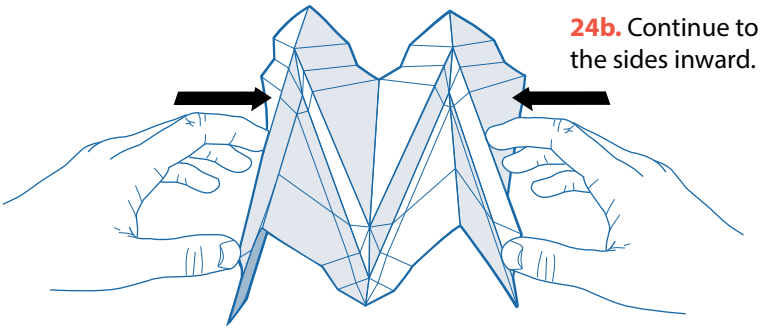
22. Rotate the paper 180 degrees.



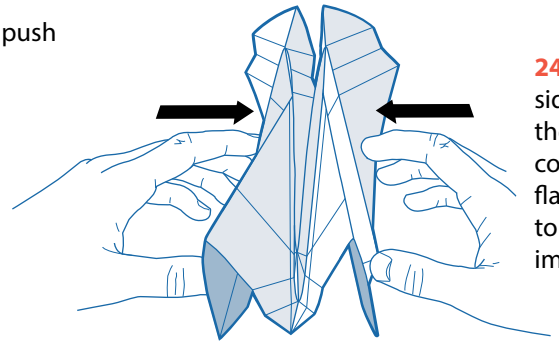
23. In preparation for step 24, set the red lines to be mountain folds, and the black lines to be valley folds. Notice that a portion of each vertical crease is a valley. Creases that are blue are not important to the next step.



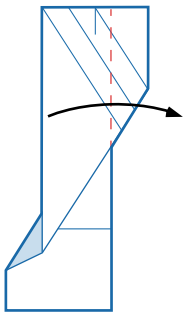
24a. Begin pushing the sides in to the center. The folds in the paper should begin to form more dramatic peaks and valleys.



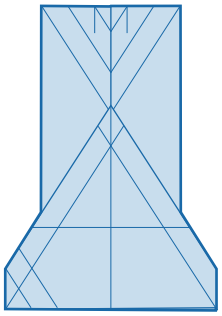
24b. Continue to push the sides inward.



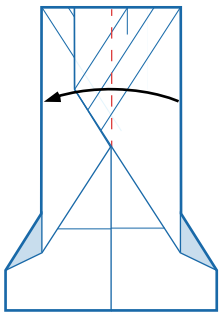
24c. Push the sides inward until the paper fully collapses. Lay it flat on the table to match the image in step 25.



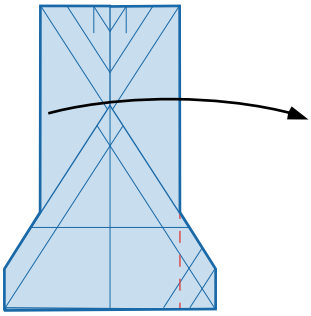
25. Open the left side of the paper. As you flatten the paper it will create a crease on the line shown. It is important to make sure that this crease is perpendicular (90 degrees) to the top edge of the paper.



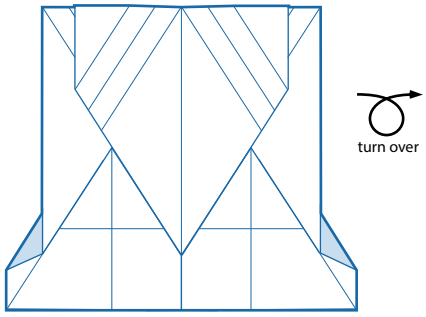
26. Turn the paper over.



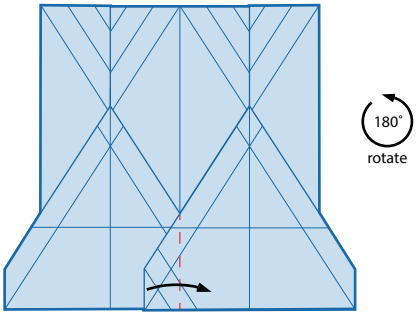
27. Open the right side of the paper. As you flatten the paper, it will create a crease on the line shown. Again, it is important to make sure that this crease is perpendicular (90 degrees) to the top edge of the paper.



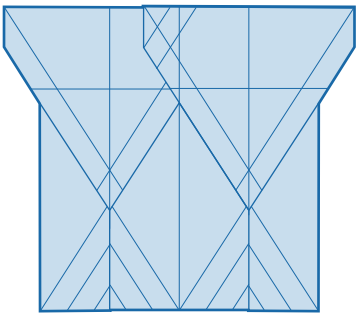
28. Open the left side of the paper. As you flatten the paper, it will create a crease on the line shown. Make sure that this crease is perpendicular (90 degrees) to the bottom edge of the paper.



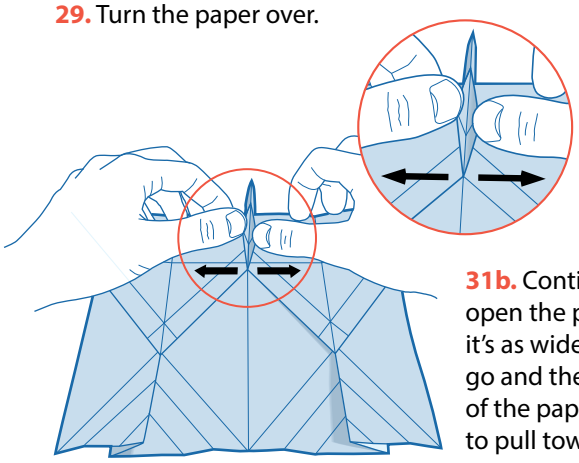
29. Turn the paper over.



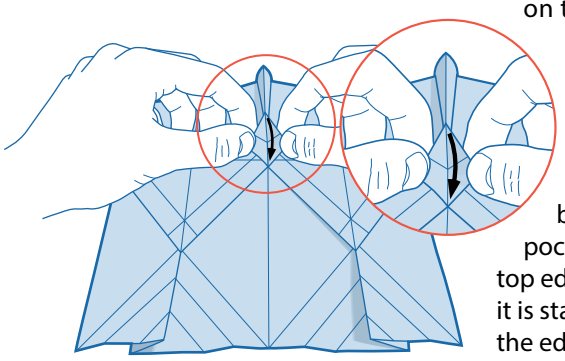
30. Fold the flap to the right on the indicated line. Make sure that this crease is perpendicular (90 degrees) to the bottom edge of the paper. Then rotate the paper 180 degrees.



31a. Stand the flap vertically and use your thumbs to open the pocket on the front of the flap.

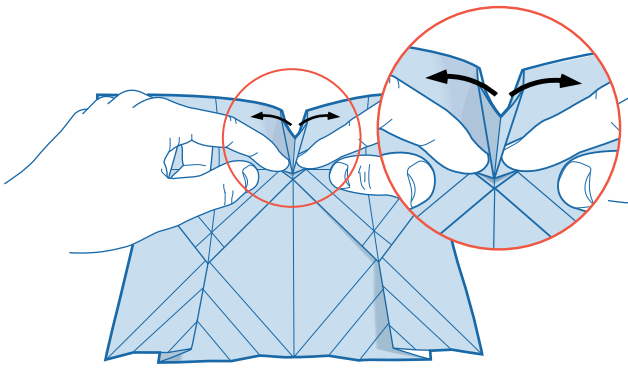


31b. Continue to open the pocket until it's as wide as it will go and the top edge of the paper begins to pull towards you.

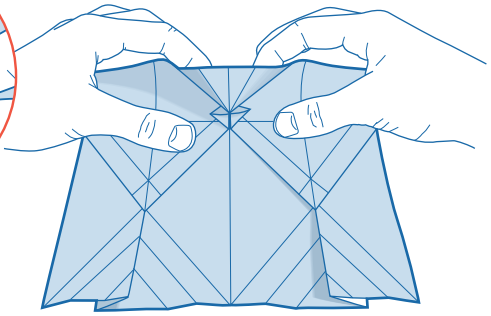


31c. Pull the top point of the pocket down to meet the bottom point of the pocket. This will pull the top edge of the paper so that it is standing in the air. Flatten the edges of the pocket.

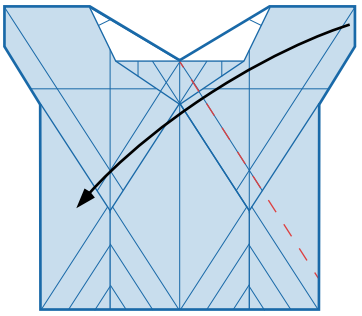
Step 31 is tricky. If you're struggling, be sure to watch the video tutorial for help.



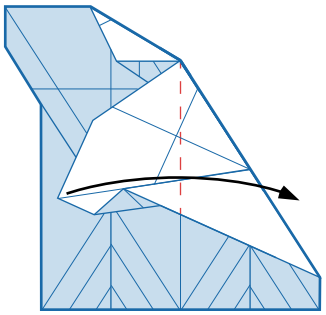
31d. Reach behind the top edge of the paper and fan it out to look like the illustration in step 31e.



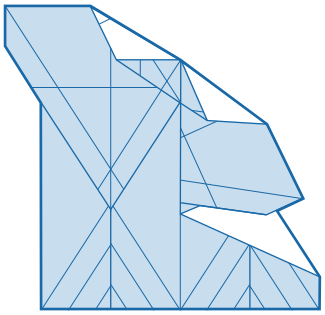
31e. Flatten the paper to look like the illustration in step 32.



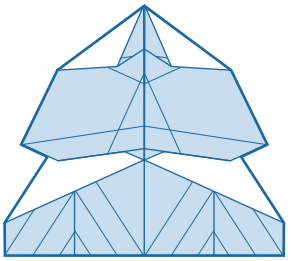
32. Fold the right side along the indicated crease.



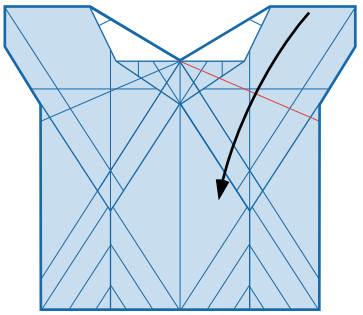
33. Fold the top layer back across the center line.



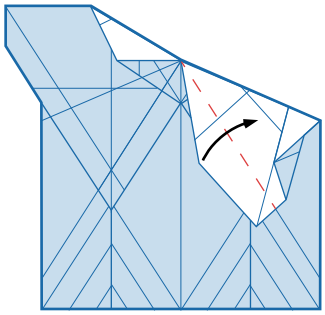
34. Repeat steps 32 and 33 on the left side.



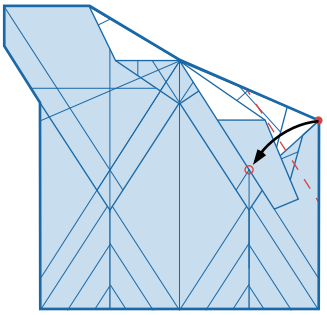
35. Unfold both sides to match the illustration in step 36.



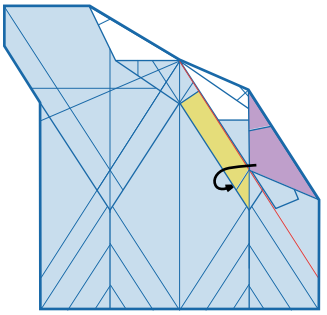
36. Fold in on the crease highlighted in red.



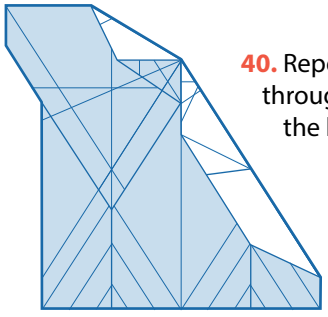
37. Fold the left edge of the top layer back over the crease used in step 32.



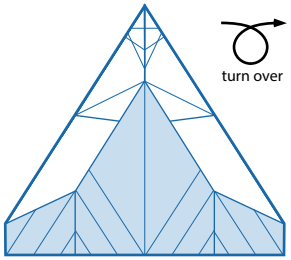
38. Fold the right corner to the indicated point.



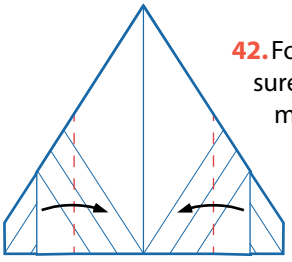
39. Fold in on the existing crease made in step 32, highlighted in red. As you do this, tuck the point of the flap highlighted in purple into the pocket created by the layer highlighted in yellow.



40. Repeat steps 36 through 39 on the left side.



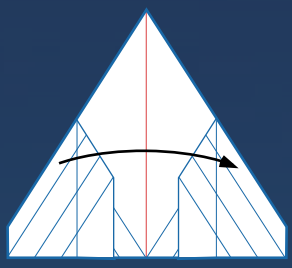
41. Turn the plane over.



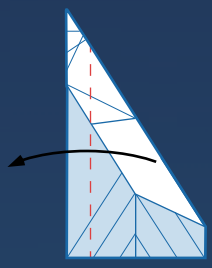
42. Fold the fins in. Make sure the creases you make are parallel to the center crease.

FOLDABLE

FLIGHT



43. Fold the plane in half using the existing center crease.



44. Fold the wings on the indicated line, beginning your fold just above the thickest part of the nose of the plane. Make sure your crease is parallel to the left edge of the plane.

45. Open the wings.

46. Finished!

Throwing Tip: The F-80 Centurion is hard to fold, but easy to throw. Throw it as hard as you can, or as gently as you like — this plane will fly, and fly well.

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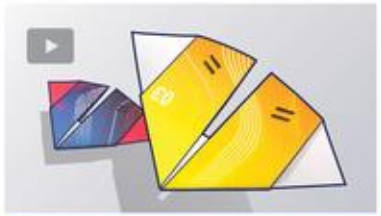
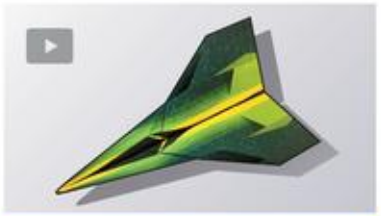
Video Tutorials



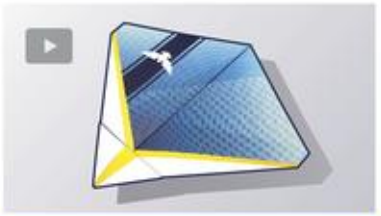
Circuit Racer

Speed
Glide
Accuracy



Invictus

Speed
Glide
Accuracy



Elanus

Speed
Glide
Accuracy

Monarch

Speed
Glide
Accuracy

ABOUT THE AUTHOR

Kyle Boyer works professionally as a graphic designer and paper airplane content creator. He has worked with leading designers such as world record holder John Collins, esteemed origamist Jayson Merrill, popular YouTuber Jeremy Shafer, and others to bring incredible paper airplane content to the world. Every plane in this book is designed and illustrated by Kyle.

Kyle fell in love with paper airplanes early in life and has been designing his own models since he was seven. He views them as functional sculptures that provide a wonderful intersection between his interests in engineering and art. He specializes in illustrating amazing templates for paper airplanes that take them from cool to *ridiculously sick*. You can find more illustrated folding papers and folding tutorials for Kyle's planes at FoldableFlight.com or Youtube.com/FoldableFlight.

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- Links to video tutorials for each plane
- Beautifully illustrated folding paper
- Tips for improving your throwing technique and the performance of your planes
- And more!

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